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VOLUME XV.
NUMBER 6.

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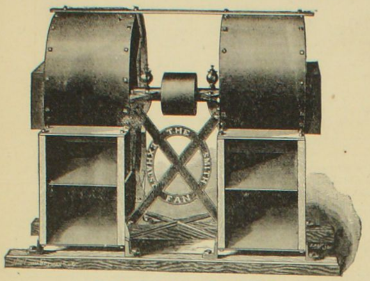

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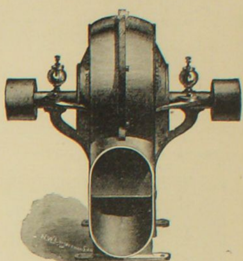

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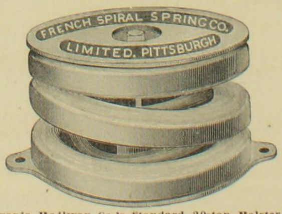

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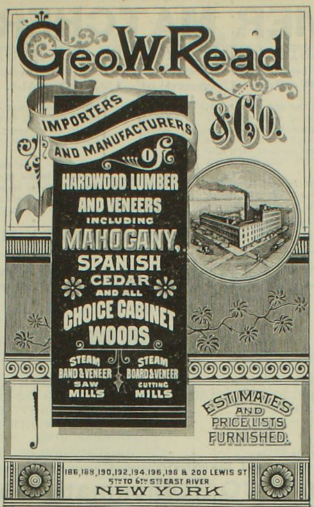

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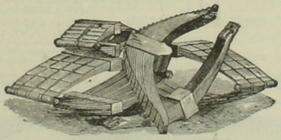

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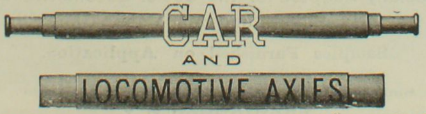

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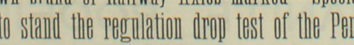

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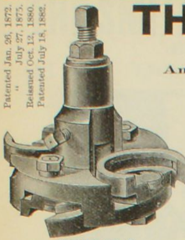

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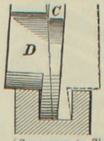

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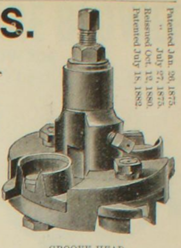

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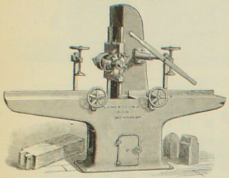

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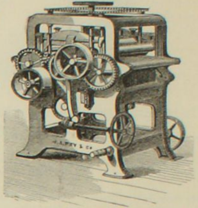

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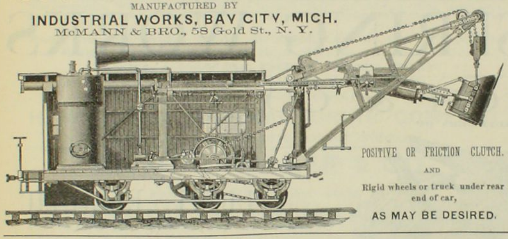

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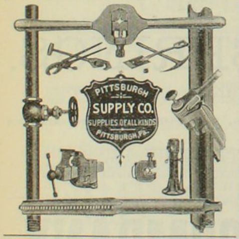
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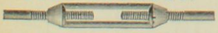

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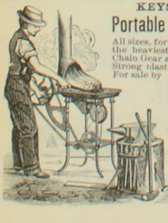

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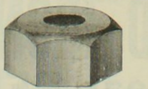

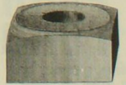

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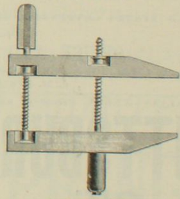

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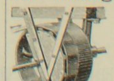

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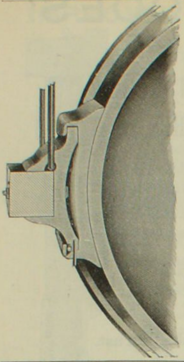


ADVANTAGES:

1. The brake shoe and head are simpler than any other now in use.

2. There is the greatest cooling space.

3. The BEARINGS being at the EXTREME ENDS of the brake head, the pressure is at the most desirable points.

4. There is the least possible friction, and, consequently, less wear on the brake heaa.

5. The shoe itself is the only detachable part.

6. It can be taken off DIRECTLY from the side.

7. It can be changed without any slackening of the brake rods, and where the shoe swings close to the wheel, as when atmospheric brakes are used.

8. There is no interference with the flange of the wheel when the shoe is being removed or replaced.

9. A change can be effected in the least possible time.

10. The shoe and head can be cast without extra cost.

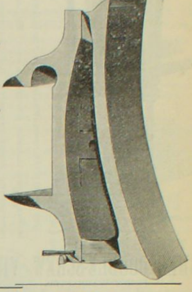
11. The head weighs several pounds less than the head of the well-known "Christy" shoe, to say nothing of the expensive wrought-iron curved key used with the Christy.

12. The fastening is permanent.

13. It requires no special fitting, as it can be made of any ordinary rod.

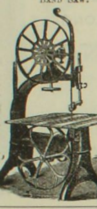
14. There are no pins or keys to be fitted, and

15. None to be lost or removed when the shoe is changed.



Sample Shoes Sent on Application. Correspondence Solicited.

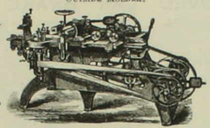
BAND SAW.



MANUFACTURERS OF WOOD-WORKING MACHINERY.

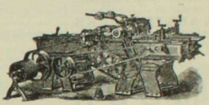
The Latest Improved
MACHINERY
for
Railroad Car Shops.

OUTSIDE MOLDER.



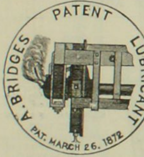
Planers, Vertical Car Tenoners, Gaining, Tenoning, Rotary Mortising Machines.

INSIDE MOLDER.



C. B. ROGERS & Co.,

MANUFACTORY, NORWICH, CONN.
WAREROOMS, 109 Liberty St., New York.



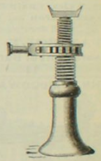
HOT JOURNALS ENTIRELY PREVENTED.

BRIDGES' LUBRICANT

FOR RAILROAD CAR JOURNALS AND OTHER BEARINGS.

SAMPLES FURNISHED GRATIS. SEND FOR CIRCULAR.
Manufacture Ball's Telescopic Screw Jack.

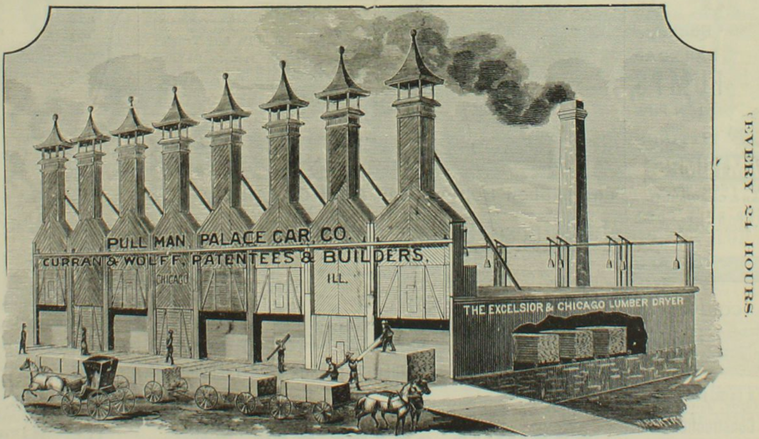
JOHN S. URQUHART, Successor to
ALBERT BRIDGES 46 CORTLANDT STREET NEW YORK.



THE EXCELSIOR AND CHICAGO LUMBER DRYER IS BUILT UNDER 16 PATENTS.

PAYS FOR ITSELF EVERY YEAR.

Storing Capacity, 40000 Feet Inch Lumber.


PULLMAN PALACE CAR CO.
CURRAN & WOLFF, PATENTEES & BUILDERS.
CHICAGO
ILL.
THE EXCELSIOR & CHICAGO LUMBER DRYER

DRYING 8,000 FEET PINE LUMBER EVERY 24 HOURS.

RAILROAD COMPANIES AND CAR-BUILDERS WHO ARE USING THE EXCELSIOR AND CHICAGO LUMBER DRYER:

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B. & M. R. R. R. Co., Omaha, Neb	1	N. Y., O. & Western R. R. Co., Middletown, N. Y	1	Billmeyer & Small Co., Car-Builders, York, Pa	1
Norfolk & Western R. R. Co., Roanoke, Va	2	Louisville & Nashville R. R. Co., Louisville	2	Southern Car Co., Car-Builders, Knoxville, Tenn	1
Wilmington & Weldon R. R. Co., Wilmington, N. C	2	Pullman Palace Car Co., Chicago	8	Georgia Car Co., Car-Builders, Cartersville, Ga	1
Denver & Rio Grande R. R., Denver, Col	2	Wells & French Co., Car Builders, Chicago	3	Gilbert & Bush Co., Car-Builders, Troy, N. Y	1
A. T. & S. Fe R. R., Topeka, Kan	2	Michigan Car Co., Car Builders, Detroit, Mich	2	Ensign Mfg. Co., Car-Builders, Huntington, W. Va	3
Flint & Pere Marquette R. R. Co., Saginaw, Mich	1	Ohio Falls Car Co., Car-Builders, Jeffersonville, Ind	2	Peninsular Car Works, Car-Builders, Detroit, Mich	2
C., M. & St. Paul R. R. Co., Minneapolis, Minn	2	Barney & Smith Mfg. Co., Car-Builders, Dayton, O	4	Northern Pacific R. R., Brainerd, Minn	2
Memphis & Charleston R. R. Co., Memphis, Tenn	1	Jackson & Sharpe Co., Car-Builders, Wilmington, Del	2	R. & D. R. R., Richmond, Va	2

D. L. WELLS, President. W. B. SHULTE, Vice-President. H. L. NORTON, Sec. and Treas. F. E. WALKER, Engineer

WELLS & FRENCH CO., BRIDGE AND CAR-BUILDERS, CHICAGO, NOV. 13, 1880.

Messrs. Curran & Wolff, City:

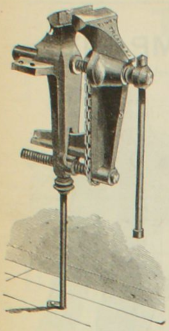
GENTLEMEN: In reply to your favor inquiring as to the two Dry Kilns you built for us two years ago, we take pleasure in saying that they have given us entire satisfaction.

We are drying upward of ten thousand feet of inch boards in each Kiln every twenty-four hours, and the lumber comes out of the Kilns free from checks or damage of any kind resulting from the process.

We have concluded to build another of your Dry Kilns, finding them indispensable in our business, and we do not see how any one doing business requiring a large amount of lumber can get along economically without them.

Yours truly,
THE WELLS & FRENCH CO.
H. L. NORTON, Sec. and Treas.

CURRAN & WOLFF, Proprietors and Builders, 39 and 41 FRANKLIN STREET CHICAGO, ILL.



Our NO. 6 VISE opens 10 inches, with 8-inch Jaws; has solid forged screws 1¾-inch diameter, with 26-inch lever. We make 5 smaller sizes of same pattern. Special discounts to R. R. Companies and Car Companies on application.

THE
FISHER DOUBLE-SCREW VISE.
FULLY WARRANTED.

Stronger than any other Leg Vise
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The Best Vise for R. R. Machine Shops and Car Builders, and for all heavy work.

Accurate and Durable.

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THE EAGLE ANVIL WORKS,
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Sole Agent in the United States and Canadas for the
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Bar Iron of great strength and uniform quality
Plate Iron unequaled for Fire Boxes.
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STAY-BOLT IRON.

A full assortment of Bar Iron in store.

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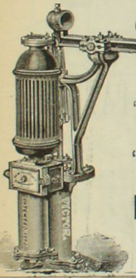

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RIVAL STEAM PUMPS.
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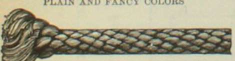
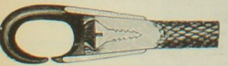
PLAIN AND FANCY COLORS



BELL-CORD COUPLINGS.



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HENRY W. WELLINGTON, Agent, BOSTON

Wrecking and Construction Car.

All the main features, such as leveling car, turn table, self-adjustable stop for vertical post, twenty feet hoist, working over embankments, swinging load—car body or more—direct on to freight car, hinged jacks, direct grapples to rail, and other important features, all perfected and patented by Jewett, foreman of a wrecking gang for many years. For further information apply to the builder,

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NOTICE.—To build an efficient wrecking car, many of the main features of this car would have to be incorporated into it, which would be an infringement of my patents. Such cars are being built by the undersigned (having special tools for the work) at very reasonable prices, and no charge made for the patent rights, which would have to be paid for by the user if made by an unauthorized person.

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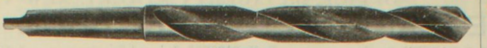

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Patent Twist Drills, Machine Bits for Wood, Bit Stock Drills, Reamers, Standard Gauges, Milling Cutter and Special Tools, for use in Railroad, Car and Locomotive Shops. **NEW BEDFORD, Mass.**

VULCANIZED FIBRE COMPANY,
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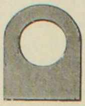

HARD & FLEXIBLE VULCANIZED FIBRE.

Flexible Vulcanized Fibre Dust Guards and Oil-Box Covers,

being absolutely unaffected by oil or heat, are far more durable and efficient than Leather, and much cheaper.

Office and Works; Wilmington, Del.

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MOSCOW, 1872, Great Gold Medal. VIENNA, 1873, Progress Medal. ST. PETERSBURG, 875, Gold Medal.

Safety,
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Brilliancy.

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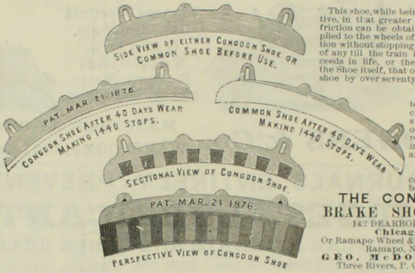
COMPANY,

19 William Street, New York.

H. HOWARD, Pres. F. KUHNE, Treas. W. K. JEWETT, Sec'y.

CONGDON'S IMPROVED CAR BRAKE SHOE.


SIDE VIEW OF EITHER CONGDON SHOE OR COMMON SHOE BEFORE USE.
PAT. MAR. 21. 1876.
CONGDON SHOE AFTER 40 DAYS WEAR MAKING 1440 STOPS.
COMMON SHOE AFTER 40 DAYS WEAR MAKING 1440 STOPS.
SECTIONAL VIEW OF CONGDON SHOE.
PAT. MAR. 21. 1876.
PERSPECTIVE VIEW OF CONGDON SHOE

This shoe, while being more effective, in that greater uniformity of friction can be obtained when applied to the wheels of a train in motion without stopping the revolution of any till the train is at rest, exceeds in life, or the durability of the Shoe itself, that of the cast iron shoe by over seventy-five per cent.

Its durability, together with cheapness and simplicity of construction, recommend it in preference to any other in use

All communications should be addressed to

THE CONGDON
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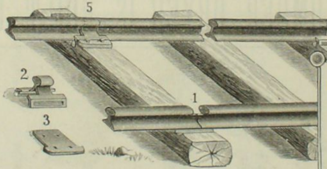
142 DEARBORN ST.,
Chicago,
Or Ramapo Wheel & Foundry Co., Ramapo, N. Y.
GEO. McDOUGALL,
Three Rivers, P. Q., Canada.

THE GIBBON BOLTLESS RAIL JOINT CO.
Of the United States.



To Lay Track:

First, place the Rails No. 1, then put down No. 2 on No. 1, as shown in No. 4, slide No. 3 into No. 4; spike down, and Joint is complete, as shown in No. 5.

The most perfect rail joint in existence. Combines all the Desirable Features of the Old Chair Joints and Modern Angle Plates, and has none of the Objectionable Features of Either.

NO BOLT HOLES!—No Low Joints!—No Creeping of Track or Spreading of Rails! ☞ Will save a Large Sum Annually in Track Maintenance, AS IT DOES AWAY ENTIRELY *with the labor of tightening up and renewing Bolts and Nuts.* ☞ For full particulars, report of Tests, etc., address

The Gibbon Boltless Rail Joint Co., Albany, N. Y.

Manganese Bronze and Brass Castings,
STRONGEST AND BEST IN THE MARKET.

FOR
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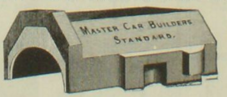
MASTER CAR BUILDERS STANDARD.

ALSO,
Babbitt's Anti-Friction
METAL,
MANUFACTURED BY

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"NO USE OF POKERS OR STEEL BARS WITH ANY COAL!"

ROCKING GRATE-BAR CO.,
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Are doing all you claim for them, in use some ten months and clean no fires where they are. Putting them in all engines as fast as they come in the shop. We run our engines the long run, 228 miles, and when they get through the fire is as clean as when starting out. Ten months in use.

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L. COES'

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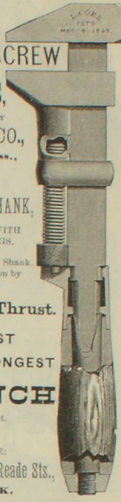
PATENT SCREW
WRENCHES,



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BAR JAW AND SHANK,

FERRULE MADE WITH DOUBLE BEARINGS.

Iron Tube Fitted to Shank held rigidly in position by handle and nut.

No Back Thrust.

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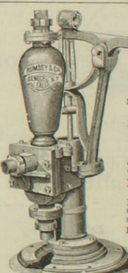
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Manufacturers of over 800 Different Styles of
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More than 50 railway companies have them in use. Also,

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Ask for Rumsey's Pumps, and address for Catalogue and full information.

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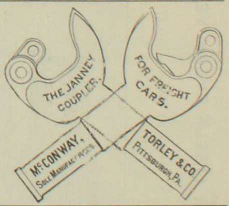
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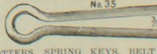

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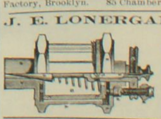

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Catalogue free.

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Pulley Blocks and Iron Sheaves.
Phosphor-Bronze Self-Lub. Sheaves
Pushers, Giant Car, $5.00 each.
Poor's Manual, 1880-81 and 82.
See p. 53.
Please write for lists, prices, etc.

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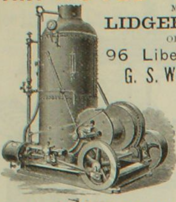

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Over 150 different sizes and styles for ALL PURPOSES.

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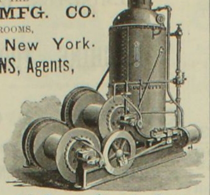
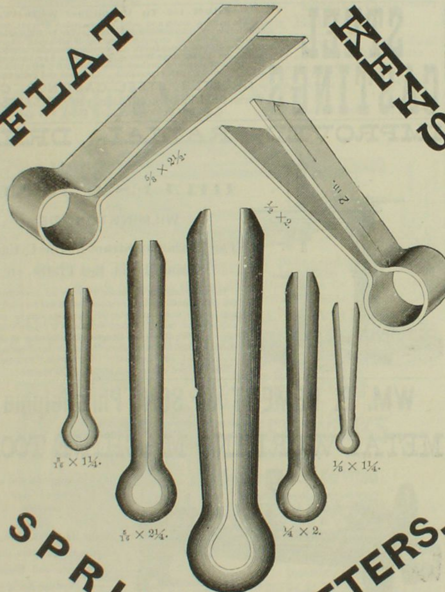


J. H HOUGHTON, Eastern Agent, 66 Canal Street, Boston.

SPRING

FLAT KEYS


5/8 × 2½.
2 in.
½ × 2.
3/16 × 1¼.
1/8 × 1¼.
5/16 × 2¼.
¼ × 2.
½ × 3.

SPRING COTTERS.

ALL SIZES OF SPRING COTTERS AND FLAT SPRING KEYS

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The Whitman & Barnes Mfg. Co.,

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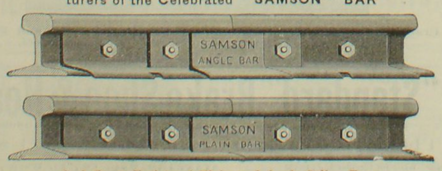
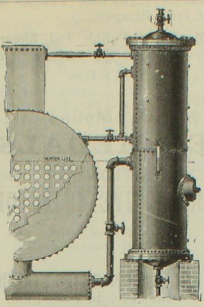
CHICAGO SPLICE BAR MILL.

MORRIS SELLERS & CO., Sole Proprietors and Manufacturers of the Celebrated "SAMSON" BAR



And Every Variety of Plain and Angle Splice ,Bars.

OFFICE. 6 ASHLAND BLOCK.... ....Mill, Chicago Ave. and the River. ....CH AGO.



STILWELL'S PATENT

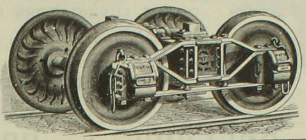
FEED-WATER PURIFIER.

(Patented March 13, 1883.)

Advantages claimed for **STILWELL'S FEED-WATER PURIFIER** over all others:

1. It does purify the feed-water and deliver it to the boiler freed from scale-producing elements and sediment.
2. It supplies the boiler with feed-water of about the same temperature as the water in the boiler, which at 90 lbs. pressure, is about 320°, thus preventing the danger arising from unequal contraction caused by injecting feed-water of a lower temperature than the water in the boiler.
3. It can be used equally well with all kinds of boilers, high or low pressure, and whether a steam engine is used or not.
4. It can be used to advantage following feed-water heaters of any kind.

MANUFACTURED EXCLUSIVELY BY
Stilwell & Bierce Manufacturing Co.,
DAYTON, OHIO.



THE THIELSEN TRUCK CO.

142 Dearborn St.,
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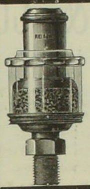

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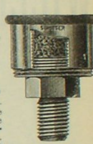

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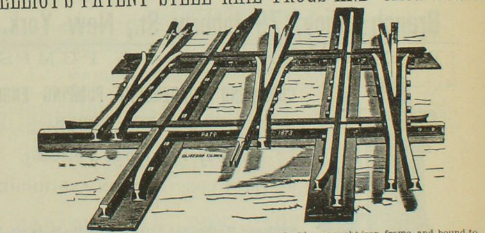
ELLIOT'S PATENT STEEL RAIL FROGS AND CROSSINGS.



These Frogs and Crossings are made of steel rail, combined with a wrought-iron frame, and bound together transversely with strong bolts, which gives them great strength and durability without destroying their elasticity. They are connected at all ends by Fish-Plate Joints, and lie on the same tie surface as the running rail without any cutting of ties, thus saving a great deal of time and labor in putting in place on track.

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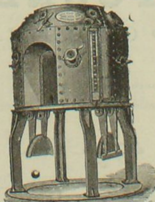

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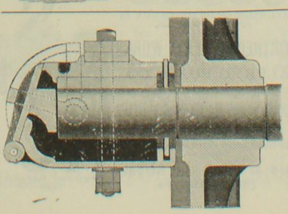

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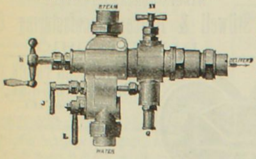

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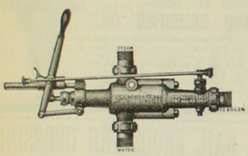

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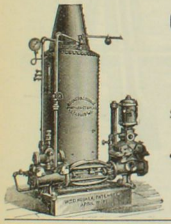

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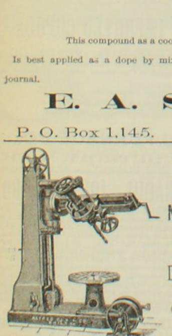

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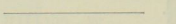

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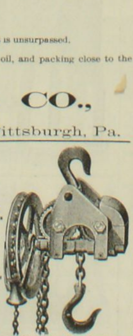

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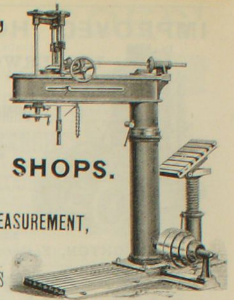

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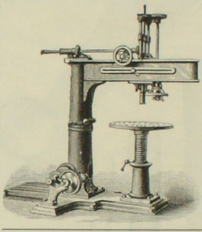

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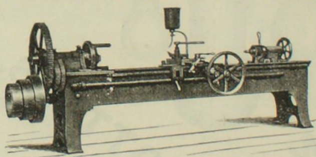

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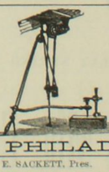

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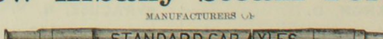

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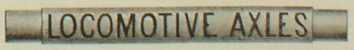

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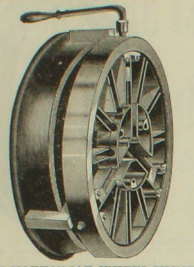

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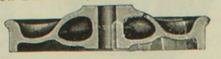

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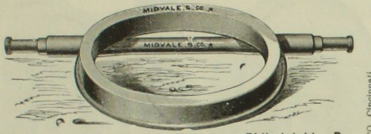
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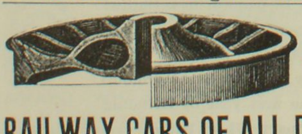

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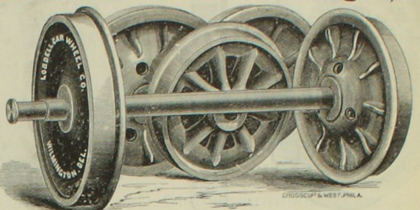
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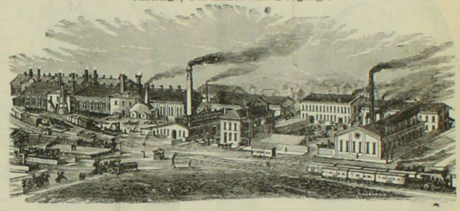

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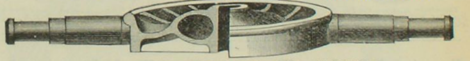

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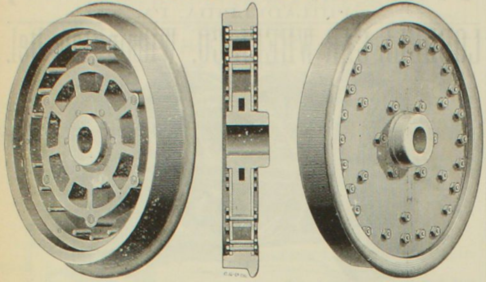

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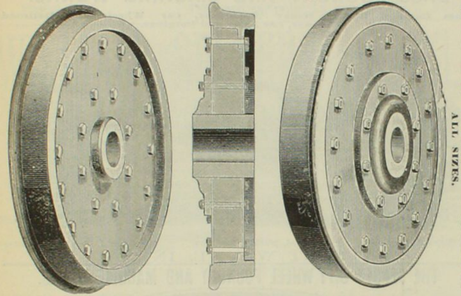

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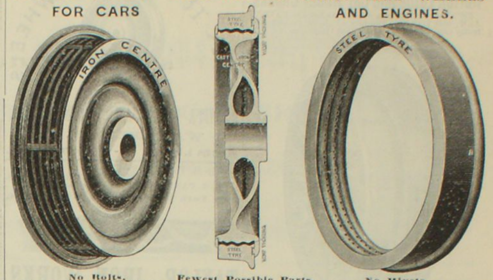

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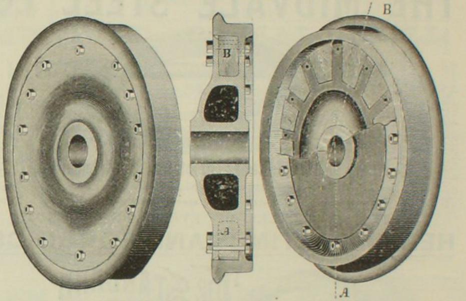

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Supts. Motive Power, Car-Builders and Master Mechanics:

Gentlemen: We wish to call your attention to our

IMPROVED COMBINATION LATHE AND GRINDING MACHINE.

This machine will turn Steel Tires quicker than any wheel lathe in use, and save the large amount of mileage which is now wasted by turning Steel Tires with a tool; as we grind the hard surface, bringing the low spot to the surface; whereas by turning them with the tool, you are obliged to go under this hard surface into the soft metal. Attached to this machine is a head for turning a "Cut Journal," at the same time you are truing wheels. This machine, by removing the tools and putting Abrading Wheels in their places, makes an improved Grinding Machine, having 4 Abrading Wheels, and will do 15 pairs of new Chilled Iron Wheels per day. In the report made by the M. C. B. Association Committee, they say Old Wheels taken from the Scrap Heap and ground will make more mileage than new wheels not ground. New wheels will make an increased mileage of 25 per cent. by being ground. This tool is a great saving to railroads, for it will save its cost the first year by Grinding Chilled Iron Wheels, and its cost does not exceed the cost of an ordinary Wheel Lathe.

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MANUFACTURED AND SOLD EXCLUSIVELY BY THE

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CHICAGO, Under { Letters Patent No. 285,123. Granted Sept. 18, 1883.
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It will True (boring simultaneously) a chilled iron wheel in less time and deprive its tread of less of its integrity than any other Truing Machine in existence.

It will simultaneously Bore and True a steel-tired wheel *with greater rapidity and cut away less of its tread* than any known tool, or system of tools, for such purpose.

It will Bore a Chilled-Iron or Steel-tired Wheel *without truing the tread*, or True the tread *without boring;* embodying in combination, or independently, all the requisites of a Boring Mill, Chilled Car Wheel Grinding Machine and Tire Lathe.

Master Mechanics and Master Car-Builders fully appreciate the following Facts:

That wheels can not be cast to a true circle, and though registering exactly the same circumference in the rough, invariably differ in size when relieved of their peripheral irregularities.

That if circumferentially matched, rough Cast Wheels are bored and pressed upon their axle, one wheel of the pair being more oval than its fellow, and becoming the smallest of the pair, when both are reduced to a round, the best wearing surface must necessarily be cut from the chilled tread of the other, and best wheel, in order to make it conform in size to its mate.

It prepares the wheel for its axle; circumferential *admeasurement for pairing being made after wheels are bored and trued.*

It is a Simple, Compact and Reliable Machine, weighing 17,000 pounds, and occupying a floor space 10 × 8 feet.

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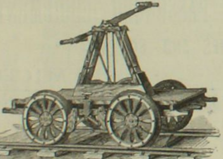

Wood Wheel Hand Cars and Push Cars.

STANDARD AND NARROW-GAUGE.

The Lightest, Most Durable, Easiest and Quickest Running Car in use.

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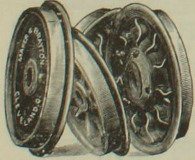

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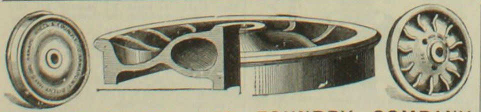

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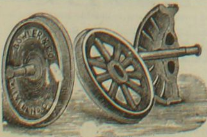

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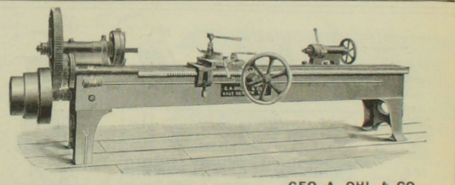

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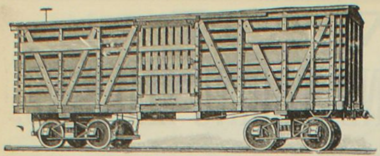

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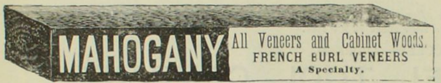
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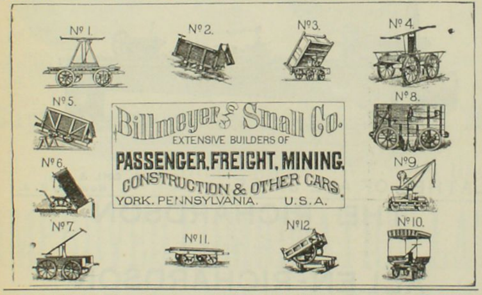
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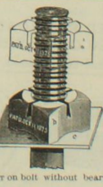

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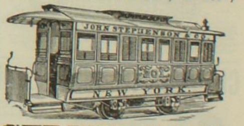

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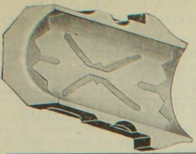

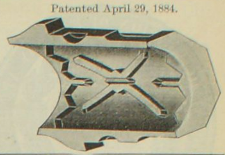

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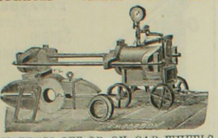

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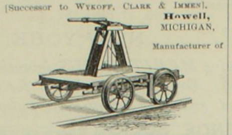

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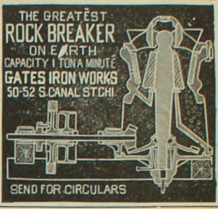

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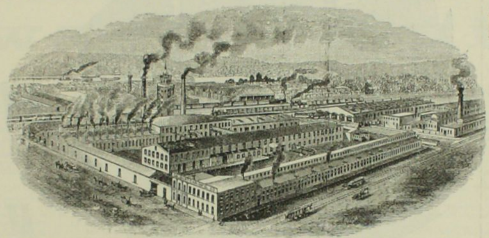

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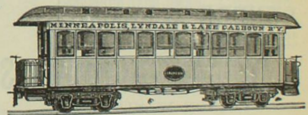

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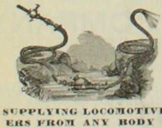

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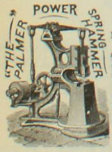

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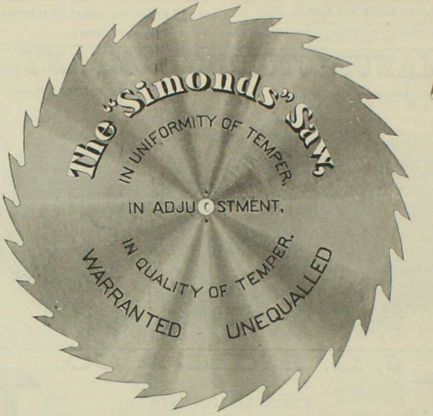

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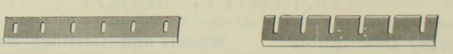

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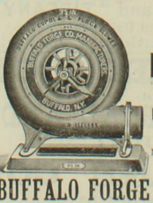
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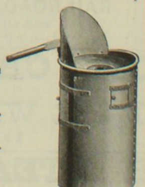

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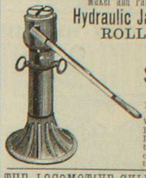

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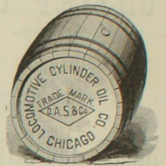
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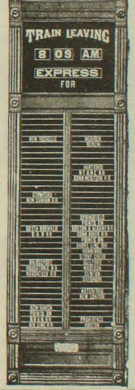

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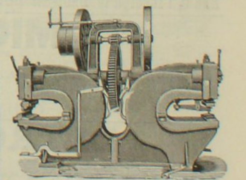

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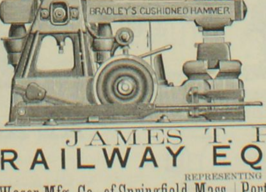

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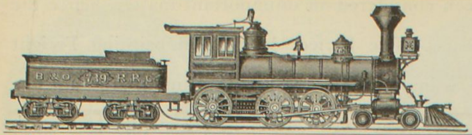

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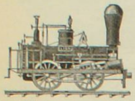

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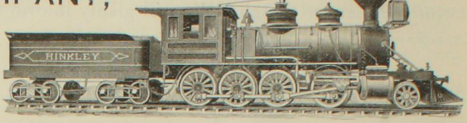

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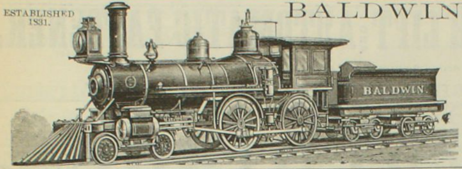

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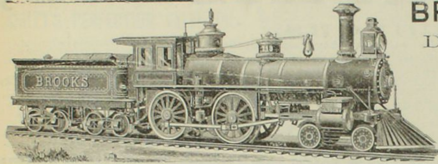

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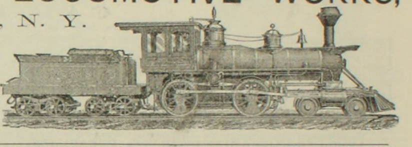

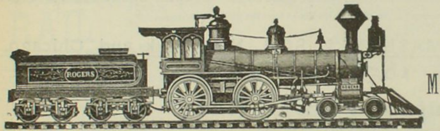

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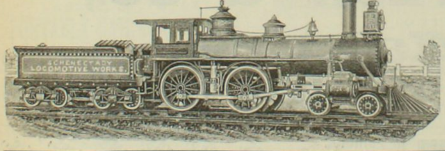

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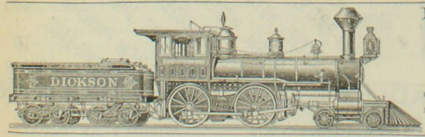

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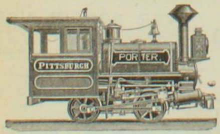

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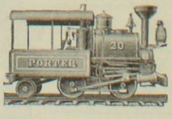

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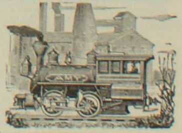

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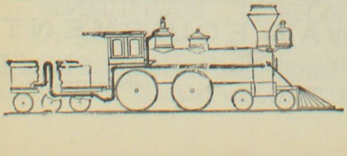

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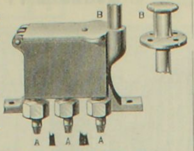

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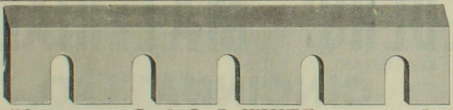

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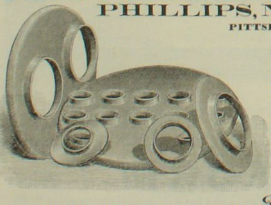

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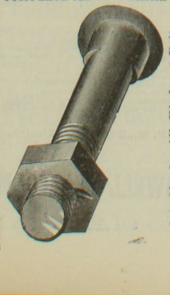

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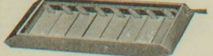

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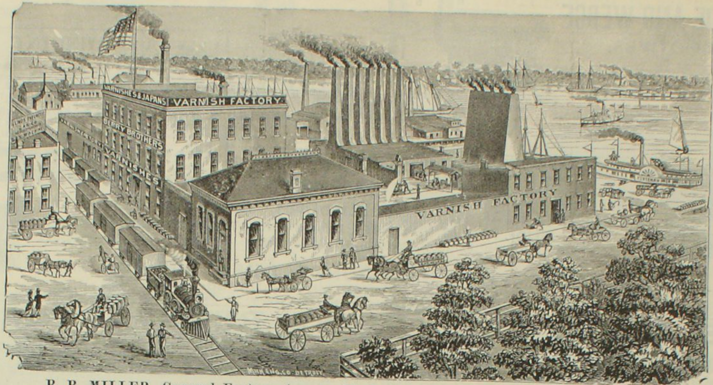

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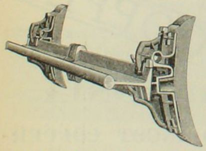

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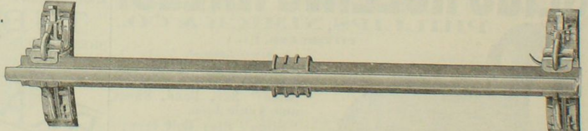

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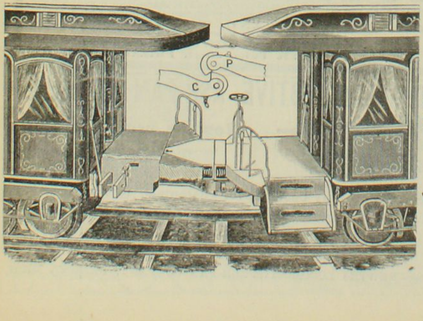

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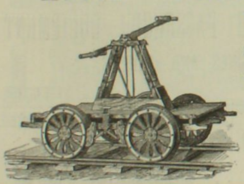

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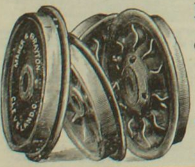

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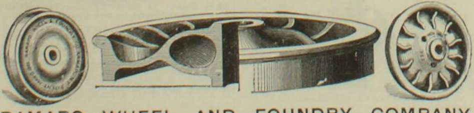

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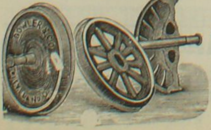

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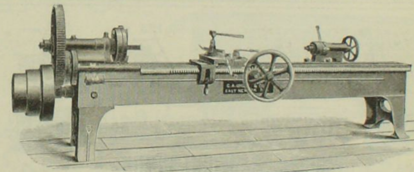

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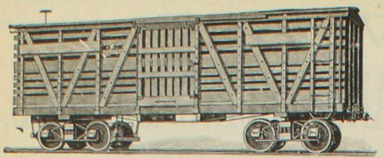

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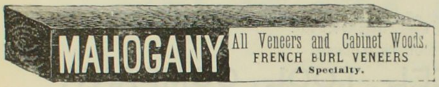

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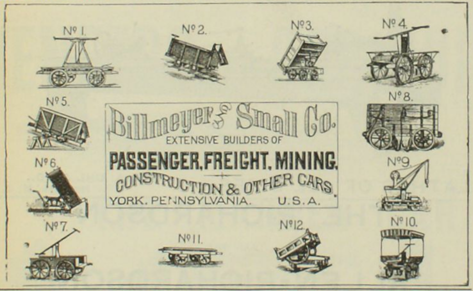

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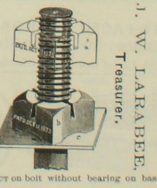

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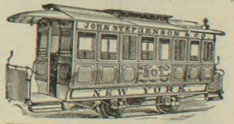

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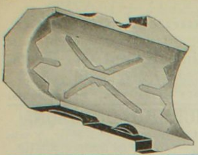

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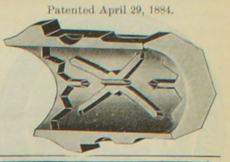

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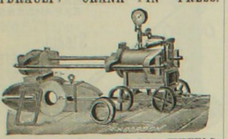

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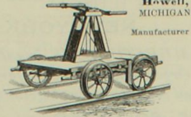

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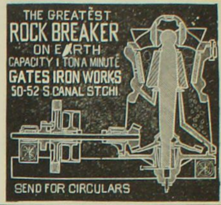

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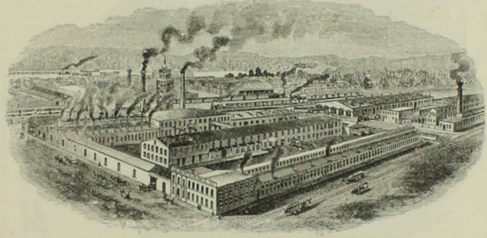

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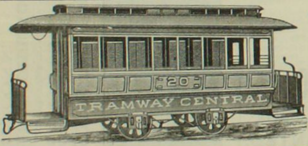

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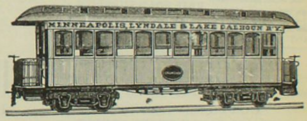
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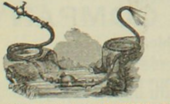

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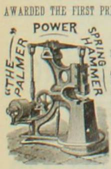
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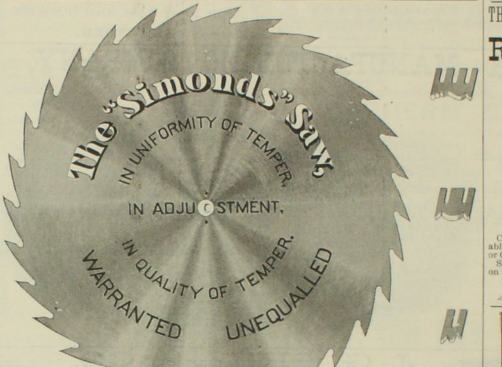

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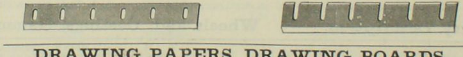

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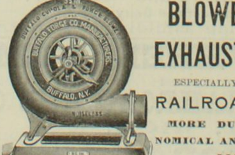
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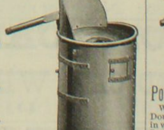

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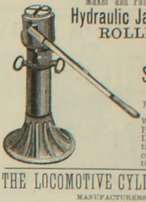

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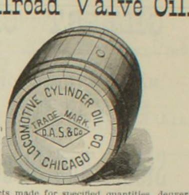
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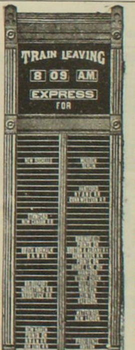

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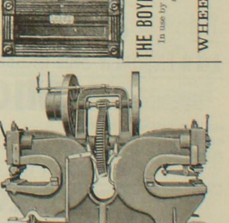

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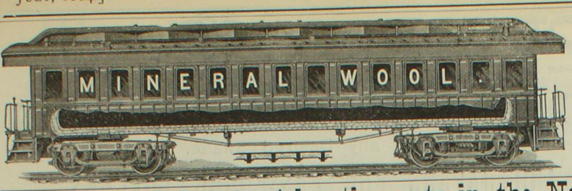
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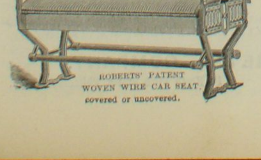

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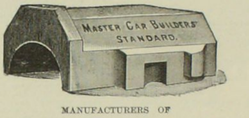
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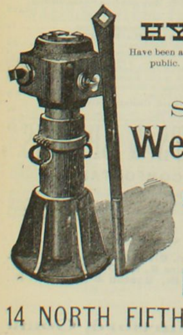

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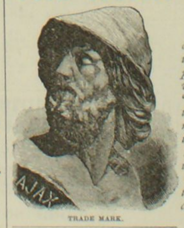

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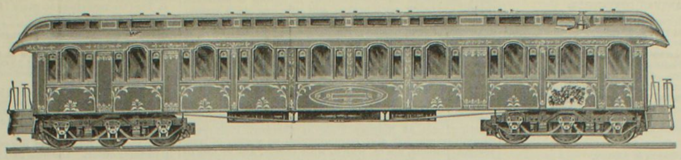

DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

VOLUME XV.
NUMBER 7.

JULY, 1884.

SINGLE NUMBERS, TEN CENTS,
$1.00 PER ANNUM.

Miscellaneous Items.

THE next annual meeting of the Railway Master Mechanics' Association will be held at Washington, D. C.

THE New York, West Shore & Buffalo road has gone into the hands of Receivers. Mr. J. D. Layng is continued as General Manager, and all agents and employés retain their positions as heretofore.

THE Westinghouse Machine Co., of Pittsburgh, sold during the months of February, March and April, 151 of their automatic engines, averaging from 4 to 160 horse-power, and for almost every conceivable use to which a steam engine can be put.

THE Congdon Brake Shoe Co., of Chicago, has arranged to manufacture and place on the market Fonda's patent chair head. It is a combination of cast and wrought iron, almost if not quite as durable as chairs that are all wrought iron, and can be sold at less than half the price.

THE American Brake Company are equipping 500 box, 100 stock and 100 coal cars now building at the Missouri Car & Foundry Co.'s works for the St. Louis & San Francisco Railway, with their brakes. Including cars previously equipped, this road has ordered, all told, from the American Brake Company brakes for about 2,000 cars.

THE Fitchburg Railroad Co. offer for sale a second-hand Wheel Borer and a Wheel Screw Press, in good order and suitable for small car shops. Parties in need of such machines can obtain information as to terms by addressing Mr. F. S. Pratt, the Purchasing Agent of the road, at Boston, Mass.

MR. GEO. MANN, of Buffalo, N. Y., proposes to make the inside of passenger cars incombustible by using asbestos as an upholstering for seats, materials for curtains, and lining for the entire interior of the car; this to be covered, when used for upholstering or ceilings, with a fine wire cloth on which ornamental designs may be wrought.

THE Bay State Hose Coupling Co., of Worcester, Mass., manufacture an improved coupling for locomotive, air brake, fire, garden and other kinds of hose, that is said to be the best in the market. It is in use on the Worcester & Nashua, and Boston, Barre & Gardner railroads. No bands or wire is used, nor tools to put them on, and they can be attached much quicker and are more reliable than any other couplings now in use.

MR. MOSES LYMAN, who has been for many years Treasurer and Superintendent of the Cayuta Car Wheel and Foundry Co., at Waverly, N. Y., has sold his entire interest in the company and retires from its management. In 1872 he built the works, and the original stockholders were largely interested in the manufacture of "Salisbury" and "Richmond" pig iron. The Cayuta car wheels have since then become well and widely known. The works will continue to be well managed.

THE Boston & Providence Railroad Co. have placed upon trial, near the West Roxbury station, Mass., some iron crossings. In the place of planks, which are generally used, but which rapidly wear out and decay, cast-iron plates have been put down. They are about 2 feet wide, and in length fill up the space between the rails. They are made with blunt projections of 1 or 2 inches, so as to give horses a firm footing, and the whole plate is slightly crowning. It is understood to be the contrivance of Superintendent Folsom, and promises to be a success.

THE government of India, which controls and operates the greater part of the railway system of that country, has determined to adopt iron freight cars, and it is advertising for contracts to furnish 1,000 cars made of that material. The specifications published show that the American freight car design has directly influenced the plans for the new India goods wagons, as they are called. They will be open cars 25 feet long, and will be carried by two trucks. The whole of the cars will be of iron—trucks, frames, and upper work. All parts must be made interchangeable, and to standard sizes.

THE Burton Stock Car Co. has nearly completed at the Laconia, N. H., car shops a car designed for the transportation of Prof. Bartholomew's Equine Paradox. It is 77 feet over all, and contains stalls for the 24 horses of the troupe, with feed and water for a week. There are sleeping arrangements for six attendants, and a private drawing-room and berth for the proprietor. The car has four-wheeled passenger trucks with 42 inch. wheels, air brakes and the Janney couplers. It is lighted with gas on the Pintsch system. The car will be run on fast passenger trains, and is designed to be used as a stable at places where exhibitions are given.

THE Chesapeake & Ohio Railroad Co. are putting steamboat whistles on all their passenger locomotives. They are said to be regarded by the public as a decided improvement, since they indicate on the approach of a train whether it is passenger or freight, and because they can be heard from a very great distance. If this is the kind of improvement that brings pleasure to the people along the line of the C. & O. road they must have curious tastes. If any improvement on the steam whistle is desired by people in other sections of the country it is certainly not in the direction of increasing the noise. A great many people along railroad lines would consider an improvement that abolished the steam whistle altogether as a most desirable change.—*American Machinist.*

A MASTER-MECHANIC on the Bee Line is firm in his belief that it is excellent policy for a road to build its own locomotives. He says: "I find they cost less for repairs, do better service, have their valves more carefully adjusted, and are more economical in every way than those that come from the regular builders." He adds: "The actual cost to the road building its own locomotives, I have found, whenever I have had an opportunity of making a comparison, is from 10 to 25 per cent. less than the builder's prices, and the working 200 per cent. more satisfactory. The extra expense of patterns, etc., should not be taken into account. Nearly every road that has a large stock of engines and an efficient repair shop carries patterns for all of its engines; so what matters it, as far as expense is concerned, whether they pay for the patterns before or after the engines are put into service?"

THE standard passenger coach of the Boston & Albany road, which conveyed Mr. F. D. Adams and others to the Saratoga Convention, is fitted with a magnetic blind fastener, which is thus described: "An ordinary spring-roller blind is used, and the foot of the blind is weighted with a bar of magnetized iron, which, projecting beyond the sides of the blind, adheres to two vertical iron rods attached to the window-post. This arrangement keeps the blind steady at any height, and, as there are practically no moving parts, it is difficult to see how it can ever need repair, and the loss of magnetism would seem to be the only possible deterioration. It is stated, however, that as long as the bars are kept in contact the magnetism remains unimpaired. Possibly any rust on the iron surfaces might, however, render the magnetic attraction ineffective. A lengthened trial will demonstrate whether the difficulty is serious."

THE Central Pacific Railroad Co. is remodeling the Crystal Palace sleeping cars, and making out of them Pullman drawing-room sleeping cars. Thirty-two are now in the shops, and when turned out they will be models of comfort and elegance. The exterior, with their Pullman color, a dark plum, striped and finished with gold and decorated and ornamented in the highest degree of the painter's art, is something superior to anything in that line ever seen on this coast. The interior is finished with an elegance not to be surpassed in any drawing-room, while all the comforts of a first-class hotel are conveniently at hand. The panel work, frescoing, painting, upholstering, etc., is simply superb. The cars are not numbered, but named. Among those almost completed are the "Palisade," "Reno," "Tucson," "Yuma," "Cocopah," "Tulare," "Nevada," "Sonoma," "Alameda," "Solano," "Los Angeles," "San Pablo" and "Elko."—*Sacramento Record-Union.*

Two elegant parlor cars, fitted for summer use, have been built at the Bradley shops in Worcester, for the Boston & Maine road. They are each 67¼ feet long, including the Miller platforms and couplers, and 9¼ feet wide, and are numbered respectively "166" and "167." They are painted lake color, with gold ornamentation. The trucks are of the master car-builders' standard, the wood-work being covered with iron plates ⅜ of an inch thick and 7 inches wide, which add greatly to their strength. Each truck has four 42-inch paper wheels. Eames' vacuum brakes are used. The inside finish is mahogany, with decorated ceilings. In the main drawing-room are 22 high-backed, revolving rattan chairs, and four end seats, upholstered in crimson plush. A smoking-room with six chairs, a lavatory, porter's closet and heater, are at one end of the car, and a ladies' toilet-room and boudoir at the other. There are 23 polished plate windows, 20 × 30 inches, on each side, and as the window-posts occupy only four inches space the sides of the car are nearly all glass.

A CORRESPONDENT of an Edinburgh newspaper, after traveling from New York to Chicago by the limited express of the Pennsylvania Railroad, and then visiting other parts of the West, writes in glowing terms of the superiority of American to British railways. The car in which he traveled to Chicago moves his ardent admiration, and he hazards the assertion that "no European monarch travels by rail so sumptuously as our republican cousins." Our system of checking also impressed him as admirably designed to promote the comfort of the traveler. After returning to Liverpool, submitting to various delays and charges, and journeying in cars painfully cold in winter and unpleasantly hot in summer, he tells us that he felt "like one who had come down in the world." Three visits to America have confirmed him in his admiration of our railway system, and he ends his letter with the hope that its suggestions may lead to the institution of reforms by the directors of British lines. The writer's views are evidently due to a careful study and practical experience of the systems in force on both sides of the water.

COMPLAINT is made concerning the extreme heat which often prevails in the Pullman cars, caused, not by the temperature of the air, which is not excessive on any part of the tableland, but by the fierce rays of the tropic summer sun beating down on the roofs and heating the cars like ovens, so that they do not cool off until far into the night. The remedy for this would be double roofs, or their equivalents in the shape of awnings stretched over the roofs, an expedient which has been tried with great success elsewhere. It is probable that by this means the heat could be reduced by several degrees, and one of the greatest drawbacks to travel by railway removed. The car of the general manager on the Sonora Railway is thus provided with an awning which gives the most satisfactory results. In order not to obstruct light and air from the ventilating windows, it would be advisable to divide the awning into three sections, one being stretched over the raised portion of the roof, and the remainder over the roof at the sides, below the ventilating windows. It would probably be also desirable to protect the roofs of the first-class cars in the same way, the additional comfort thus giving them a most substantial advantage over the second class.—*Mexican Financier.*

AT Sheffield, England, there has just been produced a new kind of steel, which, it is expected, will be of incalculable value to the manufacturing and railroad world. It is said to be made "by adding from 7 to 20 per cent. of the ordinary ferro-manganese of commerce to iron either wholly or to a good extent decarbonized and refined, and treated by any of the ordinary processes, or to steel produced by such processes." It is stated that a small test bar containing 12 per cent. of manganese was bent double when cold, and was sufficiently hard to turn iron; that an axe containing the same percentage, and which had never been hardened or tempered, cut in two a bar of iron half an inch square. A correspondent of the *American Manufacturer*, giving these facts, says that the steel is capable of being hammered or rolled, the same as ordinary steel, and showed no magnetic qualities. If these accounts are in any measure correct, the discovery is likely to prove of great economic importance. Steel manufacturers are, at all events, interested in the discovery, and will await full and complete details of the process of manufacture and further test, with no small degree of interest. Whether this new process shall take the place of the present mode or modes of manufacturing steel, and entirely revolutionize the process of its making, remains to be seen. If so, then this new steel, which, it is said, can be produced at a very moderate expense, will certainly come into large use. Its use will be especially valuable in the construction of fire-proof buildings, and it will take the place of iron in girders and beams, which is now so extensively used.

Master Car-Builders' Association.

EIGHTEENTH ANNUAL CONVENTION.

THE eighteenth annual convention of the Association was held at Congress Hall Hotel, Saratoga Springs, commencing on Tuesday, June 10. The convention was called to order by the President, Leander Garey, of the New York Central & Hudson River Railroad.

Mr. Cowan, the President of the village of Saratoga, was introduced and welcomed the Association in a short address, which was responded to in appropriate terms by President Garey.

LIST OF MEMBERS IN ATTENDANCE.

NAME.	COMPANY.
Adams, F. D	Boston & Albany.
Armbruster, Jas	East Tenn., Va. & Georgia.
Baker, David H	Pennsylvania.
Billings, H. S	Pullman Palace Car Co.
Billings, S. D	Norfolk & Western.
Bissell, Theo. A	Barney & Smith Mfg. Co.
Blackwell, Chas	Norfolk & Western,
Cantrom. H	Central of Vermont.
Carter, E. D	Vandalia Line.
Chamberlain, E	New York Central.
Chapin, H. L	Lake Erie & Western.
Cloud, John W	Pennsylvania.
Coon, R. V	Troy & Boston.
Coulter, J. P	Ohio & Mississippi.
Cushing, Geo. W	Northern Pacific.
Davenport, W. R	Erie Car Works.
Demarest, G. W	Northern Central.
Divine, J. F	Wilmington, Columbia & Augusta.
Donaby, R	New York Central.
Doran, J. E	Boston & Albany.
Duncan, T. G	Cin., Wash. & Baltimore.
Ensign, S. P	Ensign Mfg. Co.
Ennis, W. C	N. York, Susq. & Western.
Finlay, L	Hot Springs, Ark.
Fletcher, J. B	National Car Co.
Forney, M. N	73 Broadway, New York.
Forsyth, Wm	Chicago, Burlington & Quincy.
Fuller, Wm	N. York, Penn. & Ohio.
Garey, C. E	N. York Cent. & H. River.
Garey, L	N. York Cent. & H. River.
Gause, J. T	Harlan & Hollingsworth Co.
Giffcken, E	Savannah, Florida & Western.
Goodwin. H. S	Lehigh Valley.
Gore, C. E	Lafayette Car Works.
Hackett, Geo	Cent. Div. Phila. & Reading.
Hackney, Geo	Atchison, Topeka & Santa Fe.
Hall, J. H	Boston & Lowell.
Hamilton, G. H	Del., Lack. & Western.
Helfrick, H. J	Louisville, N. Albany & Chicago.
Hill, John	St. Paul & Duluth.
Hitchcock, R	Connecticut River.
Hodge, John	Missouri Pacific.
Hoit, D	Gilbert Car Mfg. Co.
Hopkins, D. A	113 Liberty st., New York.
Hovey, J. P	Rochester & Pittsburgh.
Hunter, D. W	Providence & Worcester.
Irwin, Samuel	Missouri Pacific.
Johnson, F	Gilbert Car Mfg. Co.
Keeler, Sanford	Flint & Pere Marquette.
Kells, Ross	New York & New England.
Kirby, John	Lake Shore & Mich. Southern.
Leighton, J. T.	Jackson & Sharp Co.
Lentz, J. S	Penn. & N. York Canal & R. R. Co.
Lyons, H. D	Marq., Houghton & Ontonagon.
Mackenzie, Jno	New York, Chicago & St. Louis.
Manier, B. F	Jones Car Mfg. Co.
Marden, J. W	Fitchburg.
McCarty, H. C	Pennsylvania.
McDevitt, B	Chicago West Division R. R.
McGee, Jas	Houston & Texas Central.
McIlwain, J. D	Grand Trunk.
McKenna, R	Del., Lack. & Western.
McPherson, R	Flint & Pere Marquette.
McWood, Wm	Grand Trunk.
Mileham, J. N	N. Y. Central & H. River.
Miller, Robt	Michigan Central.
Montier, A. N	Kan. City, Ft. Scott & Gulf.
Ortton, John	N. York Cent. & H. River.
Packard, L	N. York Cent. & H. River.
Paige, W. H	Paige Wrt. Metal Car Wheel Co.
Phelps, B. N	Fourth Avenue R. R. New York.
Pickering, S	Boston, Concord & Montreal.
Pratt, Elias E	New York & New England.
Rhodes, D. W	Chicago, Burlington & Quincy.
Richardson, D. C	Boston & Maine.
Richardson, Jno	Cin., N. Orleans & Texas.
Riley, Patrick	N. York, Ontario & Western.
Rommell, Geo	Wilmington & Northern.
Sargent, Geo. M	Minneapolis & St. Louis.
Skinner, J. R	Delaware & Hudson Canal.
Smith, C. A	Union Tank Line.
Smith, Peter	N. York Central & H. River.
Snow, W. B	Illinois Central.
Soule, R. H	New York, W. Shore & Buffalo.
Stewart, T. B	Hartford and Weathersfield street.
Sweeney, Jno	New Haven & Northampton.
Sutherland, Tho	Chicago & Grand Trunk.
Titus, H. D	Southern Central.
Townsend, Jos	Chicago & Alton.
Trainham, W. H	Rich., Fred'g & Potomac.
Travers, J. J	Adirondack.
Turreff, W. F	Cleve., Col., Cin. & Ind's.
Verbryck, B. K	Chicago, R. Island & Pacific.
Wall, E. B	Pitts'g, Cin. & St. Louis.
Watrous, Geo. C	Detroit, Lansing & Northern.
Webster, H. A	Manhattan Elevated.
Wiers, J. H. F	Paige Car Wheel Co.
Wilder, F. M	N. York, L. Erie & Western.
Williams, C. C	West Jersey.

THE PRESIDENT then delivered his annual address in which he spoke of the advantages to be derived from uniform standards in construction, including a standard freight car truck, with brakes and attachments, a system of lettering and numbering cars, and standard detailed drawings of dead-blocks. He also spoke of the need of some kind of automatic coupler for freight cars that would do away with the necessity of going between them to do the coupling, and read extracts from the reports of the railroad commissioners of New York, Iowa, Massachusetts and Connecticut on the subject, concluding his address as follows:

"Committees have been appointed repeatedly by the Association and have made their reports. At the adjourned meeting held at Niagara Falls in October, 1882, your committee selected and recommended as worthy of trial several couplers, all of which, with others, are in use to some extent. The time has now arrived when the best known couplers should be selected and recommended by the members of the Association for adoption. Precisely how this action should be brought about it is not easy to indicate. It seems, however, that if there are any automatic couplers known to this Association which fulfill the conditions required of such appliances, that the Association should by suitable resolutions announce the fact for the benefit of railroad companies and the public. Other necessary standards should be determined upon with as little delay as possible. I take pleasure in complimenting you on the good results which have been brought about through annual meetings of the Association, and trust that the subjects to be presented for your consideration during this meeting will be judiciously disposed of."

SECRETARY'S REPORT.

The list of members published with the report of the adjourned meeting held at Niagara Falls included the names of 145 active members, 36 representatives and four associate members, or a total of 185 members. In the list published with the report of the last annual convention, the names of 45 of these active members and these representative members were omitted for various causes, leaving 100 active members, 33 representatives and four associate members, or a total of 137 old members. The last list, however, includes 33 new active members and 20 new representatives, so that the list included a total of 190 members. Since the publication of the list six active members and two representatives have resigned, but up to the date of this convention six new active members have been added to the Association, so that the membership now stands 133 active, 55 representative and four associate members, or a total of 192 members. These figures indicate an increase of only seven in the membership, if compared with the figures published a year and a half ago. That list, however, included the names of many persons who were no longer identified with the Association, and who neither attended its meetings nor paid the dues. With few exceptions the members now include only those who are interested in the Association and its work.

The number of cars represented at the last meeting was 357,030. Although not all the representative members have reported the number of cars now owned, yet from the returns received, and with those which the new members will represent, it is safe to say that there will be nearly or quite 400,000 cars represented in this convention. The arrears for dues are still quite large. There are 32 active members who owe $5 each, six owe $10, eight owe $15 and 11 owe $20 each. One associate member owes $5 and two owe $20 each, making a total due the Association of $605. There is also $632.50 due from representative members, making a total of $1,237.50. Last year the unpaid dues were $915.

The cash collected and the expenses incurred by your secretary during the year have been as follows:

To am't of dues rec'd from members during the year	$1,972.50
To amount received from sale of annual reports	28.90
	$2,001.40
By cash paid B. K. Verbryck, Treas., June 14, 1883	$572.50
" returned to persons not eligible for membership	10.00
" for stationery during year	30.55
" reporting last convention	240.00
" for printing annual report	498.57
" for engraving	70.29
" for postage for year	78.00
" for printing circulars	114.75
" for express charges	40
Balance paid B. K. Verbryck, June 9	386.34
	$2,001.40

Summing up briefly, the receipts were $2,001.40, and the expenses, not including the salary of your secretary, were $1,042.56. The Association is indebted to its treasurer for $26.78, and to its secretary $500. As there is $386.34 cash on hand, the Association begins the year with an indebtedness of $140.44. All accounts have been paid excepting some bills for printing the reports which will be presented at this meeting, but these will probably belong to the expenses of the new year.

TREASURER'S REPORT.

Received from M. N. Forney, amount of dues collected by him from members, from June 12, 1883, to June 10, 1884	$1,279.50	
Received from sale of Annual reports	28.90	
		$2,001.40
Balance due Treasurer June 12, 1883	$99.28	
Paid Secretary for 6 months salary	500.00	
Returned to persons not eligible for membership	10.00	
Paid for stationery	30.55	
" reporting last annual convention	240.00	
" printing annual reports	498.57	
" engraving	70.29	
" postage for year	78.00	
" printing circulars	114.75	
" express charges	40	
Cash on hand	359.56	
		2,001.40

An amendment to the constitution of the Association which was proposed last year was taken up and agreed to, as follows:

ART. X. The name of any member who is three years in arrears for dues may be struck from the list of members at the discretion of the executive committee.

REVISION OF STANDARDS.

THE EXECUTIVE COMMITTEE, in accordance with a resolution adopted last year instructing them to revise the resolutions relating to the recommendation of standards, submitted the following:

REPORT.

The committee recommend the following changes in the resolutions relating to standards:

1. That the action of the Association, adopted June 10, 1868, regarding a "standard guage form," and printed on pages 126 and 127 of the last annual report, and included between the titles "Standard Wheel Gauge" and "Width of Wheel Tread," be repealed.

2. That the first resolution, under the title "Width of Wheel Tread," on page 128, which recommends "5-inch tread as the proper width for car-wheels running on a compromise gauge of track," be repealed.

3. That the standard height of draw-bars for freight cars, measured perpendicularly from the tops of the rails to the centre of the draw-bar, which was adopted at the meeting held in Richmond, Va., in 1872, is hereby declared to be 2 feet 9 inches when the car is loaded to its full carrying capacity.

4. That the first recommendation, included in the first two paragraphs under the title "Dead-woods," on page 135 of last annual report, be repealed.

5. That the resolutions on pages 142 and 143 of last annual report under the titles "Patentee and Supply Agents" and "Objects of the Association" be repealed, as the purpose of the first is covered by the IX. By-law, and that of the second resolution by Article II. of the constitution.

6. That the capacity of draw and buffer springs be not less than 18,000 pounds, instead of 13,000 pounds, as recommended at the Thirteenth Annual Convention. (See page 100 of report of that meeting.)

7. That the distance, 12 inches, between dead-blocks, recommended at the sixteenth annual convention, be changed to 14 inches, that the length over all be changed from 28 to 30 inches, and the distance from centre to centre be 22 inches, instead of 20.

The recommendations of the committee were then taken up in their order. The first two were adopted. The third, relative to height of draw-bars, was, on motion of Mr. Lentz, amended so as to read 2 ft. 9 in. when the car is empty, and the question being on the adoption of the recommendation of the committee as amended.

Mr. MARDEN said: I would like to inquire how this height of draw-bar has been understood; whether the members have understood it to be 2 ft. 9 in. when the car is loaded or when the car is empty, and how many have already placed their cars at 2 ft. 9 in. when the cars are light. It seems to me when it is possible to keep the cars at 2 ft. 9 in. it is very much better to keep the centre of gravity as low as you can. Every inch you raise the car carries the centre of gravity higher from the rails.

Mr. KIRBY: I fully agree with Mr. Marden in his remarks, and I think we are going in the wrong direction in raising our cars. If I recollect, the original height as agreed upon at Richmond was 2 ft. 9 in., and nothing was aid about loaded or unloaded cars. A car may have 10,000 pounds in it and be loaded, or 60,000 pounds in it and be loaded; and while one load will compress the springs ½ an inch, the other will compress them 2 inches, if we had any springs that would compress that much. I am entirely opposed to changing the original height of draw-bar—2 ft. 9 in. when the car is empty.

The SECRETARY: I would like to ask Mr. Kirby as to whether there is any evidence at all that that is the intent. I have hunted through the reports to find out exactly what was meant in the resolution, and I fail to find any record showing whether that was empty or loaded; and it was on account of that indefiniteness that I specified here that it should be when the car is loaded.

MR. KIRBY: How are we going to gauge our cars when they are loaded? The cars are not usually at the shop when they are loaded. When we send them out they are light, and that is the way we should understand the resolution, 2 ft. 9 in. when the car is light.

MR. MARDEN: I think this is an important matter, and one deserving of consideration. I think if the question is put to a majority of the members present they will tell you they have been building their cars and putting their drawbars at 2 ft. 9 in. when the car is light. If that is the fact, we have been going on in that way for a number of years, and for us to change the height of the drawbar without giving due consideration to the subject is not doing justice to the railroad companies which we represent. I think it is a matter which we should consider carefully and vote on understandingly; and I for one should most decidedly object to making any change in the height of drawbars.

MR. ADAMS: It was undoubtedly understood by the generality of car-builders throughout the country that 2 ft. 9 in. was the height when the cars left the shop. Nineteen-twentieths of the cars that have been built since have been built 2 ft. 9 in. light.

After some further discussion the recommendation of the committee was adopted after striking out "when the car is loaded" and inserting "when the car is empty."

Recommendations 4, 5, 6 and 7 were agreed to.

It was also agreed that a committee be appointed in accordance with a resolution passed last year, to prepare a circular calling the attention of railroad managers to the standards and appliances for the safety of trainmen, and to the amendments that have been recommended by the association, and that the committee do all they can to secure their adoption.

Mr. KIRBY said he was appointed chairman of the committee last year, with the privilege of selecting his associates, but had taken no action for the reason that some are in favor of a 25-ton car, some 50, and some even go as high as 50 and 60 tons. How could standards be recommended when there is such a diversity of opinion?

A communication from the Secretary of the Board of Railroad Commissioners of the State of New York was read, giving the experience of one Benj. Douglass, imprisoned in an overturned sleeper by a wreck, and who had to wait 15 minutes until he could be cut out through the roof. They asked on account of the request of Mr. Douglass that the association consider the possibility of putting a trap-door in the roofs and floors of all sleepers be considered. The executive committee desired that this should receive attention. There being no representative of either the Pullman or Wagner companies present there was no discussion, but a committee was appointed, consisting of Messrs. Adams, Keeler and Blackall to investigate the subject and report.

DISTANCE BETWEEN FLANGES.

Mr. BISSELL made a sketch on the blackboard, and said: As the wheels are now made they differ in measurement from the points where they rest against the rail to the inside of the flange. They vary from 1⅜ in. to $2\frac{3}{16}$ in. By resolution we have made them 1⅞ in., but car-builders do not make them so exactly; and in applying our gauge it is difficult to measure on the rear side of the flange without regard to the face of the wheel. In this case I have placed them 2⅛ in. A heavy load might spread your rails in such case. Another difficulty is, I may have 1⅜ in. on this wheel and 2¼ in. on this one, and if I work from the center of my axle and put them 5⅝ in. apart, I have the point that works against the rail nearer the center of the journal on one wheel by the difference in the flange. In using the gauge that we adopted, simply on the rear side of the wheel, the thickness of the flange will cause our wheel to be irregular. In making wheels we work from the face. They are turned on the face without regard to the rear side. Our cast wheels are not regular. We work from the face side, but it seems to me impracticable to work from the rear side until we have established a flange. The flanges must be uniform or we must work from the face of the wheel.

Mr. DAVENPORT was under the impression that all standards embracing this form of tread and flange had been adopted by letter-ballot, but was informed by the Secretary that such was not the fact, as would be seen by reference to page 128 of last year's report.

It was voted to remit the dues of Mr. Lightner and Mr. Baker, the two oldest members of the association, agreeable to the request of the executive committee.

It was also voted to post all members in arrears of dues in convention room, after giving them 60 days' notice. This would not apply to those wishing to withdraw from the association.

STANDARD TWO-FOOT RULE.

Mr. GEO. M. BOND, of the Pratt & Whitney Co., formally presented to the association a standard two-foot bar or measure, derived directly from the standard yard in the possession of the British Government. This bar is a standard which is hardened at each end, and has a section such as will insure rigidity when in its normal position, the line measure uppermost. The lines are ruled with a diamond on the highly polished surface ends of the bar, just above the surfaces which define the end measure. These lines are graduated in bands of three lines, each line separated from the others of the same band by a space of 2/1000 of an inch. The three lines are thus made plainly visible to the eye, and for delicate tests the edge of the middle line may be used as stated, and engraved. There is no correction at 62° F. End Measure may be compared directly from the standard bat within any desired limit of accuracy.

WHEEL FLANGE AND RAIL SECTIONS.

Mr. FORNEY read a lengthy paper on the "Relation of Railroad Wheels and Rails to each other," and containing numerous illustrations. The paper presents a large array of facts bearing upon the question of the proper form of tread and flange of wheels and head of rails. The real action of coned wheels, which has been a dispute point since the first days of railway working, was shown by a very simple and conclusive experiment, demonstrating that a vehicle with wheels of unequal diameter will run in a curve whose radius is proportionate, not to the difference in diameter of the surfaces of the tread bearing on the rails, but to the length of wheel base. A four-wheel truck of 5ft. wheel base, with wheels coned according to the prevailing practice, would tend to run in a curve of nearly a mile radius. This is demonstrated by a model which was exhibited in action to the meeting. Mr. Forney stated that repeated experiments gave the same results, leaving no doubt as to their accuracy. The paper concludes as follows:

The variation in the distance between the flanges of wheels also suggests that there should be some positive limit to this variation. With cast-iron wheels and tough flanges exactness of gauge is impossible. If the distance between flanges is fixed at 4 ft. 5⅜ in., it must be left to the judgment of the workmen how much variation therefrom is admissible. Experience shows that if the discretion of workmen in such matters is relied on, that great variations from the standard are almost certain to result. The Pennsylvania Railroad officers have wisely fixed the limit, or least distance between flanges of wheels which will be received on its line, at 4 ft. 5¼ in. It seems as though the standard gauge roads might properly adopt a maximum limit. It is therefore thought that it would be a wise measure if this association should adopt a maximum and minimum standard distance between flanges of wheels. If, instead of fixing this standard at 4 ft. 5⅜ in., it was stipulated that it should not be more than 4 ft. 5½ in., nor less than 4 ft. 5¼ in., the differences and errors would be confined within those limits. As the standard is now expressed the distance is made full or scant, which may mean 3-32, ⅛, or ¼ in. more or less than it ought to be.

The suggestions of this paper may then be summed up as follows:

1. That the standard form proposed in this paper for the treads and flanges of wheels should be adopted experimentally by this association; that is, that the members should agree to put a sufficient number of wheels with treads and flanges of that shape in service, so as to be able to report thereon at the next annual meeting, with a view to the final adoption of the form as a standard.
2. That the distance between the backs of flanges should be limited to maximum and minimum dimensions as proposed.
3. That the officers of the permanent way departments should agree on some standard form for the corners and tops of rails, preferably ½-in. radius for the corners and 6-in. radius for the tops.
4. That they should agree on some point on the rail from which the gauge should be measured.
5. That they should establish a standard gauge for the distance over all guard and wing rails.

MR. GOODWIN, referring to the report made by the committee on sharp flanges last year, and the general practice among wheel makers of making the curve between the tread and flange ⅝ inch, said: That seems to have been the curve agreed upon and adopted by all parties making wheels, both railroad companies and wheel makers. Now, it seems to me, that having adopted that radius of the curve, we have got one step towards solving the problem which is before us, and the remaining step is to bring about the making of rails of the same radius. Now, if the rail is made of the same radius on the corner or top, it will fit the flange and remove what we consider to be a very great cause of sharp flanges; and this "precious metal" that Mr. Forney speaks of will not be worn off. I like that idea of calling it precious metal. We have already received this report and ordered it to be spread on the minutes as part of the proceedings. It is a very able report, and perhaps I may say exhaustive. I am very much pleased with it indeed. It shows a great deal of attention and research on the part of the Secretary. But I differ with him on one point. I think that his plan of wheel-tread is a most admirable one. I think he has an excellent idea in regard to that, with the one exception of the radius of the curve; and if he could modify that and leave the rest just as it is, I think he will have a tread of wheel that will be just about as near perfect as we can get it. In regard to the shape of the rail, and a radius of ⅝ in., I would say that we have used on the Lehigh Valley road, rails with a curve, for the past 12 years, or perhaps longer, and they are in use also on some other roads. I believe there is a general tendency now to get rails into that shape, and it would be a movement backward that would throw the whole thing into confusion to alter that. I would recommend, then, in regard to the suggestions made here, that before adopting that standard form it should be changed so as to make the radius between the flange and tread of the wheel ⅝ instead of ½ in. I move that the standard form as presented here be changed to show a radius of ⅝ in. instead of ½, and also that that ⅝ be substituted in article 3rd for ½ in.

Mr. DAVENPORT: In the matter of wheels there are two stand-points from which you may look at the question—that of the engineer considering the track and the car-builder who considers the wheels, or, if you please, the wheel maker considering how he can make the best cast-iron wheel give the greatest average mileage and be the safest wheel to run, and which will be liable to the smallest number of mishaps that might befall a wheel in service. The form of wheel, as Mr. Goodwin has suggested, has some excellent points about it, and in only two respects would I suggest any change. The height of the flange of a wheel has much to do with what you are able to make the wheel perform. It is a very difficult matter, if you have the height of flange more than one inch, to get a depth of chill in the throat of the flange that is necessary at that point. How to get that is the problem. If the throat of the flange be ½ in. I think you will find it simply impossible. I think every wheel maker present, and every wheel-maker in the country will inform you that 1⅛ in. height of flange, with ½ in. radius at the throat, will make a light chilled wheel in the throat of the flange and light for service. This is a well known fact among wheel makers. The height of flange has been going down, step by step, as practice has shown the bad policy of high flanges. The Pennsylvania road, I am informed, adopted 1 in. as the height of their standard flange. They are wise in this beyond doubt. There is one other point. The suggested form of the flange gives a thin flange at the upper edge. That will involve a chilled-through flange, which I do not think any car-builder wants. If the wheel is a high chilled wheel, the flange will be chilled through probably ½ of its height, and weakening the flange to that degree. Now I have had drawn by practical men a little diagram which copies almost exactly the flange and tread proposed, except in these two particulars of height of the flange and the radius of the throat of the flange. In these two respects it differs. The height of the flange proposed is 1 in. and the radius ¾-in. This, you will observe, will give you a flange with great power of resistance. The flange, you know, constantly grows higher as the wheel wears. You will have a flange throat with a great deal of wear in it; a very strong flange, and one which comes within the requirements which have been made and adopted. I move as an amendment, that this is what we would advise as the form of flange and tread of what may become the standard car.

Mr. GOODWIN: It would be interesting, I think, if Mr. Davenport would rehearse the dimensions and shape of this plan. We would like to know what is the radius of the curve, what the distance between the back of the flange and the vertical line of the curve, fillet, etc.

Mr. DAVENPORT replied as to the dimensions, but the manuscript of the reporter is unintelligible. In reference to coning the wheel treads, Mr. D. said: All things of this kind are subjects for compromise, those holding to the cone idea are not going to give it up entirely, and those holding to the straight idea will continue to hold to it; and, therefore, in order to effect a union there must be a compromise, and the yielding of 1/16 in. there except that instead of forming the tread of the wheel in a hollow we run it straight across, having a little more metal for wear. True, it may be said that the cone wears off. Certainly. The wheel wears out, but while you are wearing that cone out you are making a mileage. You understand, of course, that this is not any pet hobby of mine, but it embraces practice which has given results superior to those that have been attainable with ⅝ in. radius at the root of the flange. It has been demonstrated in practice and is not a matter of theory at all; and the amount of good that shall be found by reducing the height of the flange ⅛ in. and increasing this fillet to ¾ in. is something that no one but a wheel maker can appreciate. It is to avoid that that this flange is rounded in the form in which it is. It can be done without injury to service and will enable an amount of chill to be got into the throat of the flange which will account for the great difference.

Mr. GOODWIN: What is the radius of that curve between the tread and the flange?

Mr. DAVENPORT: It is ¾ in.

Mr. GOODWIN: What is the difference from the back of the flange up to the vertical line?

Mr. DAVENPORT: 1⅞ in.

Mr. GOODWIN: As I proposed a ⅝ in. radius in place of ½ in. suggested by the Secretary, I would still propose a ⅝ in. radius in place of the ¾ in. proposed by Mr. Davenport, but for the opposite reason perhaps. Now we know that rails have heretofore been made with a shorter radius, and the tendency is now to get them at ⅝ in to fit the wheels; and the statement I made has not been controverted here, that it is the practice of almost all wheel makers to make that curve with a radius of ⅝ in. Now, if we are trying to get the rails out to that and make a good fit between the rail and the wheel, this will throw the matter into confusion again as badly as if we attempted to come back to ½ in. The labor that we have expended on this matter will go for naught, and we will be worse off than we are now. I do think it is a very important matter to keep that curve at ⅝ in. I have nothing to say against Mr. Davenport's plan of tread. How can we ask anybody to make a rail with a flatter curve on top? If you keep flattening that, you will get the whole top of your rail curved, and the consequence is you narrow your point of contact with the rail, which is objectionable. I think if this motion of Mr. Davenport prevails, and that plan takes the place of the one proposed by our worthy Secretary, we shall be worse off than if we adopted his plan.

Mr. DAVENPORT: I would say in regard to that, that I do not controvert what the gentleman said about the almost universal practice being ⅝, but I wish to say that it will be found by examination into this matter that the practice of a very large number is ¾ and not ⅝.

Mr. GOODWIN: What railroad company in this country, or in this part of the country, uses a curve different from ⅝ in.? I do not know of any.

The SECRETARY: I might ask Mr. Goodwin to refer to Figs. 1 to 15. Those are engravings made from drawings furnished by wheel makers to our President at the meeting we had in New York, and they are exact copies, as near as they could be made from the drawings furnished by the wheelmakers of the flanges they were making. Fig. 1 is 21/32; Fig. 2, ⅞; Fig. 3, 17/32; Fig. 4, 19/32; Fig. 5, ⅝: Fig. 6, ⅝; Fig. 7, ⅝; Fig. 8, ¾; Fig. 9, ¾; Fig. 10, 21/32; Fig. 11, 1/16; Fig. 12, ¾; Fig. 13, 25/32; Fig. 14, 21/32; Fig. 15, 23/32.

Mr. GOODWIN: Is it not true that these plans are very old and many of them obsolete? I would like to inquire of the representatives of some of the heavy roads in the country what radius they use? On the Lehigh Valley we use ⅝. I do not know of any road in our neighborhood that uses any other.

The PRESIDENT: We use ⅝ on the New York Central.

Mr. CLOUD: We make ours ⅝.

Mr. MILEHAM: I think ⅝ is the practice of the Erie.

Mr. MCWOOD: Our practice on the Grand Trunk is ⅝.

Mr. MILLER: ⅝ on the Michigan Central.

The SECRETARY: In regard to these drawings, they were furnished, as I say, by the wheel makers of the country at a meeting held in New York one and a half or two years ago. They were furnished by different wheel-makers, and represent the standards of the wheels which they were manufacturing for different roads. It may, of course, be that since that time the wheel manufacturers have changed their standards. In one case, at least, I know that has been done. I would like to ask Mr. Davenport whether he has not been furnishing wheels of the pattern he speaks of to a great many different roads?

Mr. DAVENPORT: Yes.

The SECRETARY: I think, as a matter of fact, nearly all the railroads use wheels manufactured by different makers, of which there is no uniform standard. My investigations have shown that ⅝ prevails more largely than perhaps any other one, but I do not think it is at all uniform so far as I have been able to see.

Mr. GOODWIN: In answer to the last remark, I would say I think it *is* uniform. There has been no one here to state any other radius in use. I wish if any master car-builder here uses any different radius from that he would express it. I am under the impression and belief that this use of ⅝ is universal by the railroad companies of the country at the present time, and I have yet to hear a remark to the contrary. I think, perhaps, that some wheels made in ancient times may have had different radius, but at the present time they are all ⅝.

The SECRETARY: I had some correspondence with Mr. Wootten on that same point. I received tracings from him at that time which were ½ in. radius, and inquired of him whether they had any difficulty in chilling wheels. I have a blue print in my possession, and I think it is ½ in. radius. I have no doubt Mr. Paxson is under the impression that it is ⅝, but I am quite certain from the information I have received that it is ½ in.

MR. CLOUD: It seems to be established by the secretary's report that ⅝ is not universal, but that it is the figure which is most universal. I think it is quite possible that some of the drawings which Mr. Forney received showing other dimensions were old drawings, and the only ones that the railroads could get hold of at the time.

Mr. FORNEY: They were furnished by wheel manufacturers.

MR. CLOUD: I said this more with reference to the Philadelphia & Reading road. I would call attention to the fact that there is no one of these cuts which shows smaller radius than ½ in. The lowest is 17/32. It would be interesting to know which are the railroads that have ⅞ in. or ¾ in. Three are given as ¾; all the others except the ⅞ and ¾ are very close to ⅝ and several of them are ⅝. I wish to support Mr. Goodwin's motion, that inasmuch as we have gone as far as we have in this matter, and this Convention has adopted ⅝ by letter-ballot, I think it would be entirely improper for us to take a backward step. What we wish now is, to get the superintendents of permanent way of railroads to so represent to their superior officers the necessity of having rails formed of the shape of existing wheels, so as to result in a proper combination of wheel and rail in service; and I think the difficulty of manufacturing a wheel and getting the proper chill in the throat, if the radius be only ½ in., is a serious objection. The ⅝ in. radius is small enough. We make a great many wheels at Altoona, and they are all of ¾ in. radius. It requires constant care to keep the chill properly up, on account of the construction drawing it away from the chill. This will probably increase as the radius diminishes. As regards the other features of the proposed form of wheel tread and flange, I wish to say that the feature of coning it on the outer side, which is shown in the drawing, corresponds very closely to our present practice, and our practice for some years past, in turning tires on driving wheels. They are beveled off in that way. The balance of the tread is cylindrical, which agrees with the proposed form, with the exception that Mr. Forney has introduced between the straight portion and the radius of the throat a 6 in. radius at the top of the rail head, which does not deviate much from the straight line.

MR. DAVENPORT: What height of flange is used by the Pennsylvania?

MR. CLOUD: One inch.

The PRESIDENT: I would state as to the change in the manufacture of wheels suggested at the meeting held a couple of years ago, at the time the drawings were presented, that it tended to make a more uniform system among wheel manufacturers as to width over all, form of tread and curve at the throat of flange, so that the engravings shown here do not represent properly the practice at the present time.

Mr. GOODWIN: There is another point. In these suggestions, as Mr. Forney calls them, he puts, a 6 in. radius at the top of the rail. Now the radius of our rail is 10 in. Mr. Robert Sayre drew this design in conference with the general manager of the Buffalo Iron Works, and also with the managers of rolling-mills at Troy, and they all agreed upon this shape of rail, and they have all got their rolls turned up to suit it, the idea being to introduce if possible a uniform pattern of rail for such a heavy rail. The radius of the top is 10 in. Their design is to make it as nearly flat as possible. Now if this tread of wheel is made with a radius of 6 in., it would not fit as well. I do not know whether that is a very essential point. They will soon wear to fit pretty well. Before adopting this thing I would like to hear a little discussion on that point.

MR. KIRBY: In adopting this ⅝-in. radius how will our wheels be affected running on the old pattern of rail? Before we adopt this radius should not we get the men having charge of the permanent way to join us in that, and change the form of their rail at once. If we continue with the ⅝-in. radius, and they with a much shorter one, it would be injurious to our wheels. I think in this matter we should work together, if possible.

The SECRETARY made an explantion. The two forms of tread and flange section shown on pages 42 and 43 of Annual Report had been overwhelmingly rejected by letter-ballot. His object was to propose a form of flange acceptable to both coned and straight tread men. There was opposition also to a radius at corner of rail as large as ⅝ in., and inasmuch as wheel and rail men have to be reconciled, he had suggested a ½ in. radius in order to meet these conflicting views. He would furthermore suggest that the matter be submitted to the permanent way men and wheel manufacturers before coming to any decision.

After some further discussion, the whole subject was, on motion of Mr. Lentz, referred to the Committee on Sharp Flanges, the committee to consist of Mr. Forney, Mr.

Goodwin, and three other members to be appointed by the President. It was also voted that the committee request members of the association to try the forms of wheel sections recommended by the committee, and report the result at the next year's meeting.

REPORT OF COMMITTTEE ON BRAKE-SHOES BRAKE-BEAMS, AND THE INTERCHANGEABLE PARTS OF THE BRAKE ARRANGEMENTS OF CARS.

The committee appointed to make a report on this subject prepared the following questions, which were embodied in a circular which was sent to all the members of the Association. A summary of the answers received is given after each question.

1. With your experience, what do you consider the most economical brake-shoe, wrought or cast-iron, or the so-called "Congdon Shoe" (which is a combination of both metals)?

Nine members said they preferred cast-iron shoes; eight preferred the Congdon shoes; four wrought-iron shoes; one preferred shoes made of gun metal, and three did not know what they did want.

2. Did you think that the so-called "Congdon Shoes" are better than either cast or wrought-iron shoes?

The answers to this question were about the same as those to the proceeding one, with the exception that two of those who replied claimed that wrought-iron and Congdon shoes had about the same relative qualities.

3. Do you think truss-rods applied to brake-bars are useful?

Those who answered this question approved of truss-rods for passenger cars, but considered them too expensive for freight equipment.

4. Would you recommend either iron or steel as a substitute for wooden brake-bars?

Fourteen members preferred wooden brake-beams; some wrought-iron, and three preferred steel. Among those who thought best to continue the use of wood, there were several who thought that ultimately a metal bar would be adopted.

5. What do you consider the best, solid brake-heads and shoes combined, or independent heads and shoes, made so that shoes may be removed from the herds and renewed?

Twenty-one of the members thought brake-heads independent of the shoes were most desirable, and four preferred a head and shoe combined in one piece.

6. What do you consider the safest and most durable way of hanging up brakes?

Nearly all of those who expressed an opinion preferred that brakes should be hung from the bottom bolster between the wheels. There was but one person who did not agree with this opinion.

7. Would you recommend that brakes be applied to both trucks of each car, and if so, should they be connected?

Nearly all recommended brakes in eight wheels and connected to one brake-staff.

8. Do you think that the Congdon shoe wears or cuts steel tires more than cast-iron shoes?

Of the twenty-five who answered this question, twelve had no experience with the Congdon shoes, nine thought that they wore steel tires more than cast-iron shoes do, and four had no evidence that they did not, but were not certain about it.

9. Would you recommend what is known as the "Christie" brake head for adoption? If not, will you state what in your judgment is the best brake-head and shoe?

The expressions of opinion regarding the various shoes were as follows: Six preferred the Collin shoe, which is used on the Pennsylvania Railroad; four the Christie shoe; three the Standard; one the Fowler, and one what he said was known in the western country as the reversible hook. There were three who preferred a standard head and shoe, but did not specify any special kind.

In reviewing the subject, your Committee are of the opinion that there would be great economy if standards were adopted of as many of the parts required to hang up brakes as possible, but on account of the great diversity of opinion on the subject, we are unable to determine from data obtained which would be the most valuable to recommend to the Convention, but would call the attention of the Convention to the necessity of standards, and think it would be of great importance and of great advantage to have some of the parts decided upon and turned over to the Executive Committee for final consideration.

L. Packard,
John S. Lentz,
J. W. Marden.

Mr. **Wall** moved to continue the committee, with instructions to report at the next meeting some form of brake-shoe and brake-head to be discussed and acted upon.

Mr. **Marden**, as one of the committee, was ready to recommend the Christie head and shoe *now*, and would do the same thing a year hence.

Mr. **Adams**: I suppose Mr. Marden would have the Christie shoe adopted because he likes it better than any other, and because there is a larger number reported as being used than of any other one kind. I am free to own that I prefer it to anything else. I think some 50 roads reported here that they used this shoe. If it were adopted it would be necessary to bring it into a little more uniformity than it is in at present. There are no two roads that have their patterns so much alike that they will interchange; so that there is really as much trouble with that as with the others.

Mr. **Wilder**: We have a standard brake-shoe on about 30,000 cars, while we have to make as many brake-shoes for foreign cars as we do for our own of other patterns, and I am perfectly willing, although I should not want to change our patterns, to allow our cars to be supplied with the standard brake-shoe that should be adopted by this convention to be received back on our road with a brake-head in lieu of our own, and might possibly be willing to give up our own standard and take the brake-shoe adopted by this association.

Mr. Wall's motion was agreed to.

ELECTION OF OFFICERS.

The committee on nominations reported the following names of officers for ensuing year and the report was adopted:

President—Leander Garey, of New York City.
First Vice President—William McWood, of Montreal, Canada.
Second Vice President—J. W. Cloud, of Altoona, Pa.
Third Vice President—B. K. Verbryck, of Chicago, Ill.
Treasurer—John Kirby, of Cleveland, Ohio.
Executive Committee—F. D. Adams, of Alston, Mass.; Joseph Townsend, of Bloomington, Ill., and G. W. Rhodes, of Aurora, Ill. Subsequently, at Mr. Rhodes' request, the name of Mr. E. B. Wall, of Columbus, O., was substituted for his own.

(*Remainder of proceedings in next issue.*)

REPORTS OF COMMITTEES.

FREIGHT CAR FRAMING AND TRUSSING.

The Committee on Freight Car Framing and Trussing has held three meetings and obtained from various sources all the information it could bearing upon the general subject. The Committee did not think best to issue any circular of inquiry, but instead it obtained drawings showing the practice of a number of large railroads throughout the country in this respect. After examination of these drawings the Committee deemed it best to represent the most general practices by three models, which are submitted with this report, and referred to as models Nos. 1, 2 and 3. If the Committee succeeds in indicating clearly the good and bad points of these three systems of framing, and in showing where some improvement may be made in cars of modern capacity, they will feel that the object in appointing the Committee has been fulfilled.

Model No. 1 represents what has been in times past the almost universal practice, so far as the general features of the design go. It is still the plan most generally used, but frequently with two less panels than shown in the model. This style of framing appears to have given reasonably satisfactory results before the introduction of cars of the present increased size and capacity, but that it is not as well adapted to these large cars is indicated at least by the existence of a greater variety of types, the most important of which will be referred to in models numbers 2 and 3. In the opinion of your Committee the principal defect in the frame shown in model No. 1, for modern box and stock cars, is the lack of endwise stability of the house, due in turn to imperfect side framing, as each individual panel considered alone may be dislocated by some endwise shock against the underframe, as each panel is braced in but one direction, and there is nothing in it to prevent elongation of that diagonal, and the shortening of the other diagonal.

We are well aware that the usual argument is that the car is made stiff in both directions, by the fact that the braces are inclined in opposite directions on the opposite sides of the car door to the bolsters. We are of the opinion that this has some stiffening effect but that it is insufficient to properly secure each panel from distortion by the inertia of the house and its load when the car receives a heavy shock in the line of draft, and that it is essential for durability that each panel should be so braced or tied as to be perfectly free from distortion under the various shocks which the car receives in active service. It seems to us that the life of a car body and the maintenance of shape are largely dependent upon this matter, and that it is also important that this practice be carried out in such a manner as will add the greatest amount of stiffness to the car sides laterally, so as to prevent their bulging out under pressure of the load.

Model No. 2 represents the practice on some roads which looks like an attempt to meet the very difficulties above referred to, as it contains in addition to the framing shown in model No. 1, tie-rods and eight panels running along the opposite diagonal to that occupied by the braces. It also contains an additional post in the middle of each panel extending from the side sill to the belt rail only. The tie-rods are used presumably to stiffen the car endwise, and the short posts to stiffen the sides laterally, but your committee would call attention to the fact that any panel with the brace in one diagonal and the tie-rod in the other diagonal, can still be distorted by lengthening of the former diagonal and shortening of the latter, and there is nothing in this framing to prevent just such an occurrence. Further, the additional short posts cannot add much lateral stiffness to the car sides, as one end is secured to the brace at or about its weakest point. It seems to us that any combination of Pratt & Howe trusses, such as this, is radically wrong for the reason above indicated, and that the diagonals should both be braced or both be tied to secure rigidity of the panel.

Model No. 3 exhibits another style of framing in use, apparently designed to overcome the same difficulties. This framing has posts only at the ends and at the doors, but has braces and ties alternately and with opposite inclinations, without any intermediate posts. By considering the strains in this framing we can not see any reason for greater stability from the shock than in models Nos. 1 and 2. We think that the lateral stiffness of the sides must be inferior to both of the foregoing.

Thus far we have looked at these three systems of side framing in an abstract manner and without much reference to their actual performances. We have, however, in discussing model No. 1 referred to the fact that railroad companies which formerly

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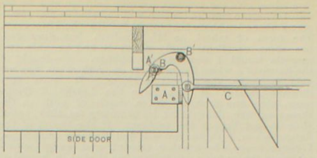


Fig. 1.

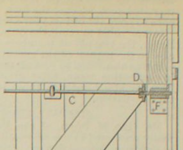


Fig. 2.

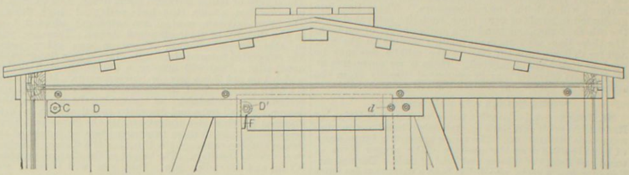


Fig. 3.

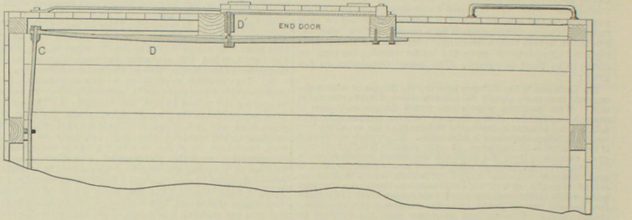


Fig. 4.

Device for Locking End Doors of Freight Cars.

The engravings illustrate a new device for locking the end doors of freight cars. It is the invention of Mr. H. G. H. Reed, General Superintendent of the Milwaukee, Lake Shore & Western Railway, and is in use upon a large number of cars of that road, with no record of failure in a single instance.

At *A*, Fig. 1, is a small angle-iron bolted to side door of car. Just above the door, and attached to the plate, is a kind of bell-crank *B*, fulcrumed and swinging from the point B^1. To this crank is attached a rod *C*, the other end of which is connected with a spring *D*, shown in Fig. 2. The spring is fixed at one end *d*, and at a point near the middle in line with the end door post, is a pin D^1 pointing outwards. *F* is a guide for pin, and is screwed to the end door post. The rod, spring and pin are more fully shown in Fig. 3. A top sectional view is shown in Fig. 4.

The operation is as follows: In closing the side door the angle-iron *A* comes in contact with the bell-crank *B*, giving motion to the rod *C*, spring *D* and pin D^1. A hole is made at a proper point in the end door when it is closed, to receive the pin, which is held fast while the side door remains closed. The pin is not seen from the outside, and the fastening is therefore secure from outside interference. Should the end door be open when the side door is closed it is only necessary to push and close the end door, when the compression of the spring caused by the closing of the side door pushes the pin into the hole made for it in the end door.

On the bell-crank *B* is a toggle-joint A^1 so arranged that while it will permit the angle-iron on side door to pass by it in closing, it will on its return catch the bell-crank and give a back motion to crank, rod, spring and pin, leaving the end door free to open when side door is open. This latter is merely an extra precaution to free the end door in case the spring *D* should not act. The arrangement is simple and practical, and much superior to the usual methods of sealing and locking the end doors. The cost of attaching it to a car is $3.50. The inventor, as above, may be addressed for further information in regard to it.

used that method had departed from it and followed the forms shown in the models Nos. 2 and 3, and we consider this the most convenient way of showing that the framing shown in model No. 1 is not well adapted to cars of modern capacity, as everyone who has had any extended experience knows to be a fact. Styles shown in models Nos. 2 and 3 have not yet been in use long enough and in a sufficient number of cars to warrant our drawing any positive conclusions from their service. We have therefore nothing further to add to the foregoing reasons why these two styles are not likely to fulfill the wants of railroads in general.

The committee finds an almost entirely uniform practice in underframe and the end framing, with the exception of some variation in depth of truss to underframe, which we think is better to be made deeper than the average practice, otherwise we have no comments to make in regard to the underframe of freight cars, except to call attention to the advantage of the use of iron body bolsters. Inasmuch, however, as there is a larger committee appointed to report in detail upon the standard 60,000 pound box-car, your committee refrains from making any explicit recommendations at this time, as they see no reason for any difference in the general style and plan of framing for 60,000, 50,000 and 40,000 pound cars, but only for changes in detail of sizes for cars of different capacities.

JOHN W. CLOUD,
R. H. SOULE,
L. PACKARD.

AUTOMATIC FREIGHT CAR COUPLERS.

Your committee appointed to make a report on "Automatic Freight Car Couplers" would respectfully submit the following:

We have sent out circulars to all representatives of the different car departments, embodying the following questions, namely:

1. In your judgment, would there be a large saving to the railroads of the country by the adoption of a standard automatic coupler?
2. Would the adoption of such a coupler be safer for trainmen?
3. Is it practical or desirable to adopt such a coupler for all new constructions or renewals?
4. If so, will you please make any suggestions which may occur to you as to the best methods to secure these results?
5. Which, in your judgment, is the simplest and most economical freight car-coupler in service, all things considered?
6. Are there any practical difficulties in the way of adopting a standard automatic coupler?
7. If so, please say what, in your judgment, they are.
8. If you were asked to adopt a standard freight car coupler for your road, what one would you select?

We have received 24 replies, 22 of which have answered in the affirmative, and 2 in the negative to the first three questions; 22 have answered No and 2 Yes to the 6th question, and there are a diversity of opinions in answer to the questions 4, 5, 7 and 8.

Your committee have given this subject careful thought, and have experimented with a large number of couplers during the past year, and we have also witnessed tests of the various draw-bars made at Saratoga. We have carefully examined all the models which have been presented at this meeting, and we find such a similarity of principle involved in various ones examined that we would suggest before their adoption they be referred to the Eastern and Western Associations for their decision as to the validity of patent. Our classification of the various draw-bars is as follows:

Worthy of Special Mention: Archer, Cowell, United States, Janney, Ames, Mitchell, Wilson & Walker, Conway Ball coupler.

As Meritorious: Gifford, Granger, Bechard, Peace & Saukey, Hilliard, Hitchcock, Prescott, Marks, Howe. Union, Perry, Burrill.

Have also examined: Quackenbush, Life & Limb Protecting Car Coupler, Lancaster, Smillie, James Horsley Pat. balanced car-coupler, Barnes Coupler, McKeen, Stebbins, Williams, Skinner, New Era, Blanden.

In conclusion we would say that we realize the importance and magnitude of the work which has been given us, and we would therefore urge upon the members of this Association the importance of thoroughly discussing the merits of car couplers. We think this subject is one which should not be passed over lightly, and think that the different roads we represent, and the public at large, demand of us a thorough investigation as to the best coupler, and prompt action in recommending its adoption. We would earnestly request that this Association appoint a committee of experts to be present at the trial, or hearing, of the different "Railroad Commissioners," or any trial ordered by the Executive Committee of this Association.

J. W. MARDEN,
F. D. ADAMS,
R. C. BLACKALL.

STANDARD FREIGHT AND PASSENGER CAR TRUCKS.

Your committee have examined the freight car trucks in general use in the United States and Canada, and do not yet find any which are sufficiently satisfactory to recommend to you as a standard.

In addition to the recommendations made in our last report, we now suggest a uniform spread of 5 feet from center to center of wheels. We also think it important that a truck for heavy loads and high speed should allow a free vertical motion of the box so that the stresses (produced by the blow of the wheel striking the joints and frogs) are not communicated directly to the truck frame. This implies either boxes working on pedestals or the side-frame, independent of the cross-frame. We present designs in which each of these conditions are embodied.

The use of cast-steel having a tenacity superior to wrought-iron and equal ductility, renders it possible to design a truck which shall have correct shape for strength, with minimum weight and least number of separate parts.

A solid pedestal frame made of this material is not objectionable on account of numerous separate castings, bolts, etc., as all other pedestal trucks *are*.

We have designed two trucks which show how a steel casting may be used for a truck frame.

Plan A shows a solid steel frame 5 ft. spread, with equalized and half elliptic springs. The pedestals, brackets for cross-frame, brackets for brake-beam hangers, and the side bearings, form *one* casting. The bolster is rigid and made similar to the tender trucks of the West Shore Railway. The brake beams are similar to those designed by Mr. George Westinghouse, and described in his letter attached to our last report. The brake gear is adapted to the automatic train brake.

The wheels are shown 36 in. diameter, but either 33 in. or 36 in. may be used. The axle has collarless journals 4 in. by 8½ in., wheel seat 5¼ in. and diameter at middle 4½ in.

The box has the Fletcher lid, and good dust-guards, made of leather secured between two thin boards.

This truck would be expensive, but we believe it would be well suited to cars of large capacity for high speed. It would be economical in repairs, and would produce little injury to the car-body and track.

Plan B shows another form of solid steel frame with pedestals, and spiral springs directly over the journal box. In this plan the car-body is suspended from hangers on a rigid cross-frame, and can swing laterally or longitudinally. The wheels, axles and boxes are similar to those in Plan A.

Plan C shows a diamond truck in which the cross-frame is independent of the side-frame, and in which the same suspension principle is used as in Plan B. The wheels, axles, etc., are similar to Plan A.

We have thus endeavored to satisfy the advocates of both rigid and swing center trucks—those who favor diamond trucks and those preferring pedestals, and it remains for you to decide which *principle* shall be adopted.

The plans are not presented for your adoption, but we believe they contain elements which may assist in the design of a truck which the majority of you will find satisfactory.

We do not think it important that a standard passenger truck be adopted, and this part of the subject should hereafter be omitted. The only passenger cars which frequently pass over different lines are sleeping cars and special cars. You may think it desirable to make some effort to secure uniformity in the wheels, axles, boxes, bearings, pedestals and brake shoes of such cars, and if so, it should form the subject for another committee.

In conclusion, we recommend that a new committee on Standard Freight Trucks be appointed, so that this important subject may be considered from a new point of view, and that your best talent be selected for the committee.

ROBERT MILLER,
WILLIAM FORSYTH.

AUTOMATIC FREIGHT CAR BRAKES.

Your Committee on Automatic Freight Car Brakes respectfully submit the following report:

A series of questions bearing on this subject was circulated by the Secretary among the members of the Association, from whom eighteen replies were received. Four of these were to the effect that an automatic brake on freight cars was a necessity, while the balance expressed the opinion that an automatic brake was not absolutely required, although its introduction would be desirable.

The advantages to be derived from the use of automatic brakes on freight cars appear very great. But it is possible that they may be counterbalanced by serious disadvantages; for were all freight cars equipped with an automatic brake the failures peculiar to this particular brake would be doubtless encountered to a very much greater extent, and at least in the ratio that the number of cars on a freight train exceeds that of a passenger train. The additional cost of application and maintenance of automatic brakes, and their incidental failures might not be objected to if applied to special cars on roads where trains composed entirely of such cars could be run. Under these circumstances the automatic brake could be operated with greater success than if generally adopted.

H. C. MCCARTY,
CHARLES BLACKWELL.

LETTERING AND NUMBERING OF LINE CARS.

Summarizing the replies recently received to the printed circular of inquiry issued by your committee, it is to be noted that the very strongest objections are offered to putting any more lettering or marking on the sides and ends of box cars than is absolutely necessary for the proper record of their ownership and movement. A large majority of those who have answered the circular also strenuously objected to having more than one number appear anywhere on a given car. It appears that in most cases the "Fast Freight Line" number and the ownership number are identical, but in some they are not. The preference of the majority seems to be that the owner's number should be reserved as a matter of office record only, and should not be allowed to appear on the car inasmuch as it is sure to cause more trouble than it will save. There seem to be wide differences of opinion as to the advisability of putting car numbers and initials on the doors of box cars.

Carefully weighing and balancing all the opinions which have been received, your committee feels justified in offering the following rules for marking cars in "Fast Freight Line" service.

1. The half of sides of car on which the doors do not slide, to show the name of the "Fast Freight Line" (spelled out in full) and the car number (in the Fast Freight Line series) immediately below it. In the same panel and within two feet of the sill shall appear (in letters not over four inches high) the name of the railroad company owning the car, followed by the word "Owners;" and between the sill shall appear the light weight of the car, with such other information as it is found advisable to give in connection with same.
2. The doors should have no marks whatever.
3. The ends to show the initials of the "Fast Freight Line," with the car number (in the Fast Freight Line series) just below them; no other marks will appear on ends of car.
4. The half of sides of car on which the doors do slide, to be reserved for advertising symbols or trade marks where used. The use of profuse lettering in this panel is to be discouraged, however, and it is recommended that only the simplest trade marks or advertising signs should be used; the capacity of the car to appear near the sill in this same panel.

The circular issued by this committee stated that record of these "Fast Freight Line" cars was always kept in the name of the Fast Freight Line. The committee have since been advised, by responsible members of the Car Accountants' Association, that this is not the case and that there are a number of "Fast Freight Lines" now running which require that the mileage of their cars shall be reported directly to the road owning and contributing same.

Your committee also beg leave to submit a standard system for lettering all other box cars (not in Fast Freight Line service) as follows:

1. The half of sides of car on which the doors do not slide, to show the name of the railroad company, with the car number immediately below it; it is preferable that the name of the railroad company should be spelled out in full; where this is not done, however, it is urged that immediately under the car number should appear, in small letters not over four inches high, the name of the owning road spelled out in full; the light weight of car, with such other information as it is necessary to give in same connection, to appear near the sill and in the same panel.
2. The doors of the car to have no marks whatever.
3. The ends of the car show the initials of the railroad with car number below them. No other marks to appear on ends of car.
4. The half of sides of car on which the doors do slide, to have no marks whatever (except in case of local freight lines which may be referred to this panel) except, of course, the capacity marks which will be near the sill and in same panel.

R. H. SOULE,
L. GAREY,
L. PACKARD.

Programme of Entertainment.

The following programme of entertainment was arranged for the members of the Master Car-Builders' Association at Saratoga:

Tuesday, June 10.—Drive to Geyser Spring and Woodlawn Park; music in the evening.

Wednesday, June 11.—Excursion to Saratoga Lake and White Sulphur Springs, leaving the hotel at 3 P. M.

Thursday, June 12.—Excursion to Mount McGregor, to leave hotel at 3 P. M.; banquet in Congress Hall at 7 P. M.

The committees in charge of the entertainment are as follows:

Executive Committee.—J. Seaver Page, J. Weymer, W. W. Snow, H. A. Rogers, T. W. Getman, J. T. Leighton, W. P. Seguine, C. D'W. Gibson, D. M. Brady.

Invitation Committee.—W. W. Snow, Wm. Toothe, Geo. W. Morris, R. M. Van Arsdale, C. J. Post, Geo. Buntin, W. P. Seguine, Jos. K. Boles, Frank Cummings, C. D'W. Gibson, F. H. Andrews, Jas. T. Leighton.

Music Committee.—Daniel M. Brady, W. K. Jewett, James C. Kellar, William M. Baldwin, Fred. P. Barnes.

Excursion Committee.—J. Seaver Page, H. S. Hale, H. A. Rogers, Aaron French, C. P. Choate, H. C. Valentine, J. E. French, C. A. Moore, A. A. Dame, F. L. Howard, E. Cliff, Chas. Miller, Frank Murphy, Wm. J. Watson, Wm. K. Chapin, Aquila Rich, R. Dudgeon, Charles E. Tripp.

Carriage Committee.—T. W. Getman, W. R. Ellis, A. D. Keyes, John Kent, J. Weymer, B. R. Miller, W. K. Chase, J. G. Hendrickson, C. M. Bolen, Thomas Smith, Thomas Griffin, Geo. W. Sweet, Jr.

Reception Committee.—F. W. Devoe & Co., Geo. H. Thacher & Co., Geo. R. Meneely & Co., Paige Car Wheel Co., Clarence Brooks & Co., National Tube Works Co., Geo. Buntin & Co., Detroit Steel & Spring Co., N. & A. Middleton & Co. (Limited), Manning, Maxwell & Moore, Ramapo Wheel & Foundry Co., Nathan Manufacturing Co., H. A. Rogers, Griffin Car Wheel Co., Otis Iron & Steel Co., Thomas Prosser & Sons, Valentine & Co., L. G. Tillotson & Co., Aaron French & Co., Murphy & Company, French Spiral Spring Co., Berry Bros., Andrews & Clooney, Allen Paper Car Wheel Co., Galena Oil Works, Gardner & Co., Cliff & Righter Co. (Limited), W. R. Ellis, Ajax Metal Co., Pintsch Lighting Co., J. S. Heartt & Co., J. L. Howard & Co., National Car-Builder, Post & Co., Troy Malleable Iron Co., Rochester Car Wheel Co., Shipman & Bolen, H. P. Nall & Co., C. T. Raynolds & Co., R. Dudgeon, Hale & Kilburn Manufacturing Co., Hicks & Smith, Jersey City Wheel Foundry & Machine Works, Winslow Car Roofing Co.

Complimentary.

The following acknowledgement of courtesies was adopted by the passengers on cars "Il Trovatore" and "Railway Age," on their return trip from attendance on the Car-Builders' Convention at Saratoga:

ON BOARD CAR "RAILWAY AGE,"
June 12, 1884.

Resolved, That we, the undersigned, herewith tender our cordial thanks to Capt. Mann, of the Mann Boudoir Car Co., and to E. H. Talbott, Esq., President of the Railway Age Co., for courtesies extended on board their beautiful and luxurious cars during the trip from Saratoga to New York.

George W. Morris, Joseph M. Rogan, Ross Kells, B. R. Verbryck and wife, E. H. Hipple, A. G. Darwin (President Allen Paper Car Wheel Co.), C. A. Smith and wife, C. R. Kearns, John Mackenzie (N. Y. C. & St. L. Ry), John A. Brill (J. G. Brill & Co.), E. H. Andress, M. E. Ward, J. J. McCarthy, John N. Reynolds, R. M. Van Arsdale, H. C. Buhoup, Henry A. Gouge, Aquilla Rich (C. T. Raynolds & Co.), W. H. Loomis and wife, H. A. Little, W. P. Seguine and wife, S. B. Shoemaker, H. S. Hale (Hale & Kilburn Mf'g Co.), Harry Hunter, and G. W. McGuire and wife, Wm. McConway (McConway, Torley & Co.).

Private Ownership of Cars.

WHEN railways were first built it was thought that they would only amount to an improved kind of highway, the company furnishing the road and motive power and each patron owning his own car. The greater advantage of having the company furnish all the facilities for transportation became apparent so quickly that the other way was hardly tried.

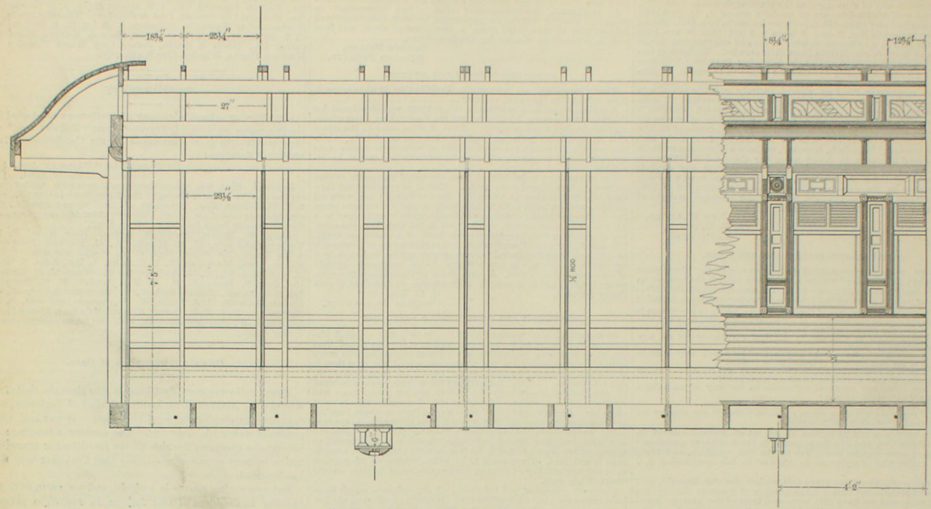
But everything moves in a circle, and we seem to be returning to the ideas of our fathers in regard to private ownership of cars. For several years theatrical and other traveling combinations have chartered or owned their own coaches, and the railways have simply drawn them over their lines. Many individuals of means now use private cars of their own, or hired temporarily. Some companies find it profitable to keep specially fitted cars for hire to hunting and other parties. It is not improbable that the number of these private cars will each year become larger until most all wealthy men and traveling organizations will journey with their own comfortable coaches. It is estimated that between two and three million dollars is already invested in private cars.

A circumstance which has had much to do in accomplishing this result is the completeness and elegance of these private coaches. They are fitted up with all the comforts and conveniences that ingenuity can devise, so that it is possible for a family or party to travel from Maine to California with almost as much privacy and comfort as they would have in their own homes.

But, however general the use of private cars for persons may become, the individual ownership of freight cars is destined to become still more common. A great trouble to extensive shippers and manufacturers has always been the lack of cars. When the busy seasons come, most roads have an inadequate equipment, so that they cannot accommodate their patrons. Because of this fact, many firms and manufacturing corporations now own their own cars and the railway company only furnishes the motive power. It is impossible to travel much without noticiing how general this practice is, especially where cars of a special size or kind are needed, as refrigerators or furniture cars. This custom must become more general until a supply of cars will become a necessary part of the plant of every large manufacturing company or organization. The railways will not be the losers, for they will not be obliged to invest such large sums in equipment, nor to be at as great an expense for repairs of cars. As for the advantages to the individual owners, they are not less important. Every firm can most profitably use cars specially adapted for the goods it deals in for necessary arrangements of their interior and construction can be provided.—*Railway Register.*

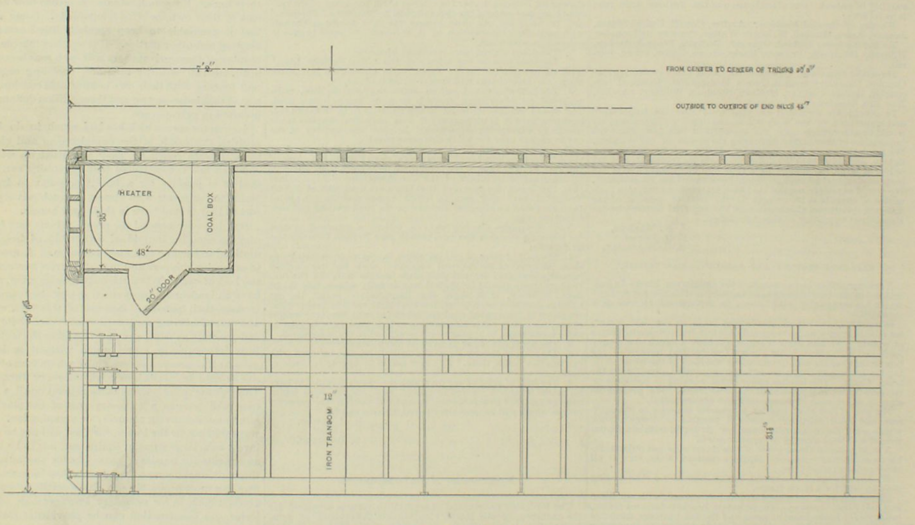
SOME experiments have been made lately upon the Bound Brook route to ascertain the difference in the consumption of coal between an express train running on schedule time and the same train run at a very low speed, but otherwise on the same conditions, the same five cars and precisely similar engines being used. The trains ran in each case from Philadelphia to Bound Brook and back, a distance of 119 miles. The slow trip was made in 9 hours and 23 minutes, 4,420 lbs. of coal being consumed. The train stopped at the same places as the regular express trains, the only unusual feature of the trip being the funeral pace, averaging a little over 12½ miles an hour. When running on schedule time the consumption was 6,725 lbs., agreeing closely with the usual consumption on this route with the regular five-car express trains. The saving effected in coal by running the train at a very slow pace was 2,305 lbs. The percentage of saving may be expressed in two ways. As compared with the consumption at the normal express speed, the slow speed shows a saving of 34.2 per cent., while the consumption at the high speed shows an increase over that at the low speed of 52.1 per cent.

STANDARD FORTY-FIVE FOOT PASSENGER COACH OF THE



Longitudinal Section Showing Frame.

Inside Finish.


7'2"
FROM CENTER TO CENTER OF TRUCKS 35'8"
OUTSIDE TO OUTSIDE OF END SILLS 45'
HEATER
35"
48"
COAL BOX
20" DOOR
9'6"
12"
IRON TRANSOM
31½"

Half Plan of Floor and Floor Frame.

DIMENSIONS, ETC.

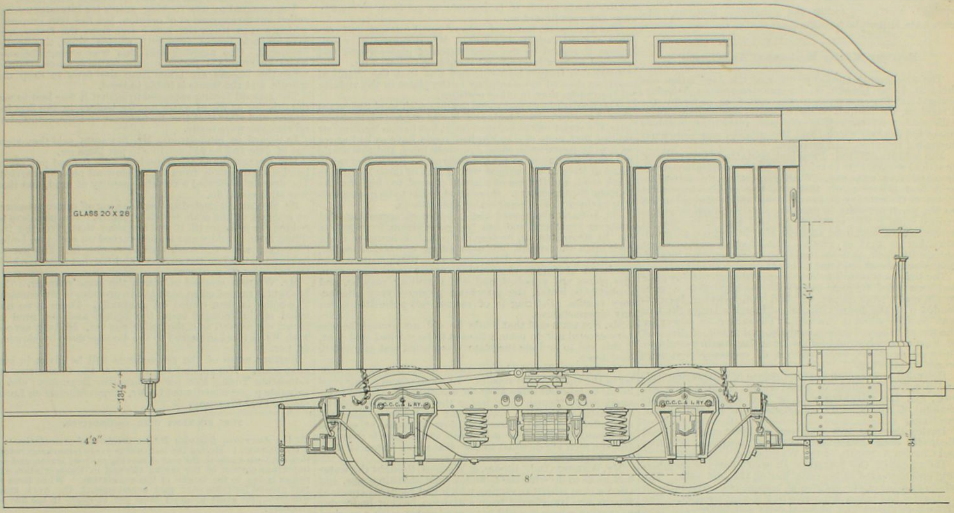
Length over Body	45	ft.	0	in.
Width over Body	9	"	6	"
Height between Floor and Plate	6	"	6	"
Side Sills	5	×	8	"
Intermediate and Center Sills	4½	×	8	"
End Sills	7	×	8	"
Plate	2¾	×	5	"
Clear-Story Plate	2½	×	4	"
Belt Rail	2½	×	3	"
Panel Rail	1½	×	2	"
Upper Belt Rail	3	×	5	"
Truss Plank	3	×	12	"
Letter Board	1½	×	12	"
Fascia Board	½	×	4	"
Truss Rods			1¼	"
Door Openings	6 ft. 7 in. × 2	ft.	2	"
Glass in Clear-Story Lights	6	×	24	"
Glass in Windows	20	×	28	"
Glass in Door Sashes	13	×	14½	"
Wheel Base	8	ft.	0	"
Wheels (Allen Paper)			42	"

The drawings illustrate the design and construction of a class of passenger cars on the above named road that are deservedly popular with the public, although they are not in their finish and fitting up unnecessarily expensive, the aim of the builders being to provide for the comfort of passengers, with a due regard to substantial and economical construction. As compared with many cars of a corresponding class upon Eastern roads, there are some peculiarities in the framing and in other details which are deserving of attention.

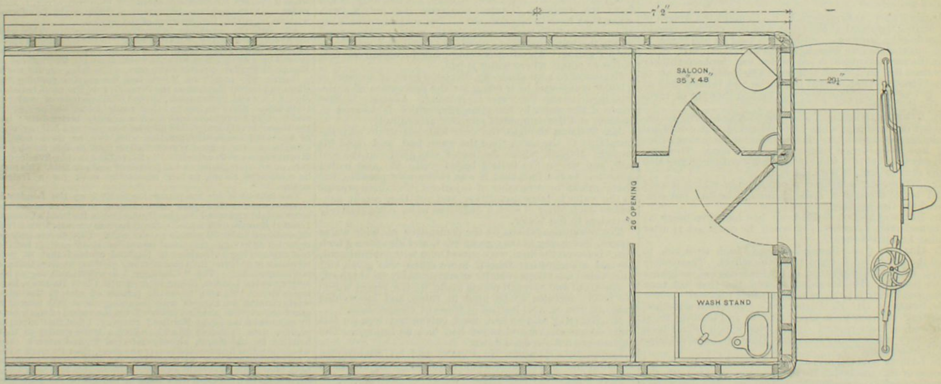
The under frame, as will be seen, consists of six longitudinal sills. The side sills are 5×8 in., and the center and intermediate 4½×8. The end sills are 7×8 in., and are held in place by joint bolts. The center and intermediate sills are spaced so as to bring as much timber as is practicable in a line with the draft and buffing strains. The center sills are 10 inches apart, and the intermediate only 6 inches from them on either side, leaving 31½ inches between the intermediate and side sills, the total width of frame being 9 ft. 6 in. The cross-framing is very close between the center and intermediate sills, and is 8 inches deep. Outside the intermediate, near the ends and over the wheels, the cross-framing is left out. There are 16 ¾-in. cross tie-rods, and two floors, one on top and one under the sills.

The side frame or wall of the car is made very strong by having one panel-rail and two belt-rails, in addition to a continuous window sill or belt. The belt-rail is 2½×3 in., and is let into the posts far enough to come flush with the outside of the panels. The panel-rail is 1½×2 in., and is let in flush, or gained upon the posts. This makes a very

CLEVELAND, COLUMBUS, CINCINNATI & INDIANAPOLIS RAILWAY.



Half Side Elevation.



Half Plan of Floor and Section Through Side Frame.

substantial foundation for the panels, which are ⅞ in. thick. Inside, there is a 3×12 in. truss-plank secured in the usual way, and above the plank a heavy horizontal finish 1¼ in. thick, reaching to the windows. This, with the deep and wide window-rail, makes the car side a sort of framed panel, very stiff and strong. Above the windows the work is much lighter, as it should be. The posts are placed 23½ inches apart for the windows. The top of the plate is 7 ft. 5 in. from the bottom of the floor-frame, leaving 6 ft. 6 in. in the clear between plate and floor. The posts are about 1½×3½ in., and the plate 2¾×5. One course of blocking on a line with the top of the windows is put in between the posts. The plate is held down by ½ in. rods going through the side sill. There are 8 iron carlines 1¾ in. wide by ½ in thick. The upper part of the roof has a radius of 15 feet., while the lower side of the short carlines has a curve of 4 ft. 8 in. The clear-story plates are framed together, and the lower one is 5 in. deep. The roof is very high, the curves being so disposed as to throw no shadows on the head-lining, a point that is often overlooked, especially in respect to the main roof lining, which is sometimes deeply shaded by heavy moldings or sharp curves. The carlines are placed in pairs in both upper and lower roof, the long ones being 1½×1¾ in., the others 1½ in. thick, with varying width.

The inside finish of these cars is particularly neat and tasteful. The ceilings are of oak, handsomely decorated, the light-colored panels contrasting well with the dark moldings, which are either cherry or mahogany. The interior wood-work in some of the cars of this road has a hard oil finish, and the panels of some of them that have been in service a long time look as bright as when they were new. In fact, the experience derived from the use of hard-oil finish is very uniform in its favor. To insure the requisite durability, however, the wood must be kept well varnished, and must not be washed with lye instead of soap and water. The floor plan is about as well designed as it could be. At one end is a saloon and an open toilet on the opposite side provided with two tanks, one containing water for drinking and the other for washing. This last-named tank is over the window, is triangular in section, and in its outward form resembles that of a closed berth in a sleeping car. Its elevated position, of course, makes a pump unnecessary. At the opposite end of the car is the heater. The outside finish is in good taste, and notably devoid of the excessive fire-works style of decoration which becomes an eye-sore as soon as cinders and smoke have destroyed the original luster of the varnish and gilding.

The Murphy A. B. C. system is used, finished in Tuscan red relieved with gilt striping, etc.

The truck wheel-pieces are strengthened with iron. The brake-beams are hung so as to keep the face of the shoes at a uniform distance from the wheels when released from pressure. How this is done is shown by the hanger on the inner end of the truck in the side elevation. The easy riding of the cars is the result of well adjusted springs, and good swing and equalizing motions. The cars have Miller platforms, constructed in the best manner.

Railway Master Mechanics' Association.

The seventeenth annual meeting of the Association was held at Long Branch, N. J., commencing on Tuesday, June 17. The convention was called to order by the President, Mr. Reuben Wells, of the Louisville & Nashville road. At the call of the roll, forty-nine members answered to their names, and the number was somewhat increased by subsequent arrivals.

The address of the President contained a variety of practical suggestions in reference to locomotive construction and fuel economy. With respect to the latter, he said that the cost of fuel was one of the important items in the running of locomotives, and called attention to the great diversity in practice, where the size of grates ranged from 16×32 to 30×60 in., and also to the size of smoke stacks, which he thought should receive as much attention as that of grates. The Wootten engine burnt anthracite slack, and he could see no reason why bituminous slack also should not be burnt.

The link-motion still held its own, although the Joy gear had been tried in some cases with the hope that a gain would result from its use. It had not, however, been attended with the desired success, although a larger fire-box was possible when it was used. The saving in power by the use of balanced valves, and the reduction of the cost of repairs which would follow from the smaller strain on the wearing parts, were features of economy that were worth considering.

He called attention to the importance of furnishing full and detailed accounts of experiments made during the year, and the advantages to be derived from an interchange of views and full discussion at the annual meetings.

During the year two members of the Association had died, viz: John McFarland, of the Chesapeake & Ohio, and Charles A. Smith, of the Washington University.

The report of the Secretary showed that the membership had increased 34 per cent. during the past year. The whole number on the list was at present 240. The railroad companies had taken 900 copies of last year's report. The Treasurer's report was, as usual, very satisfactory.

Questions for discussion were then proposed. The first question was: "At what thickness should a steel tire be removed from a driving wheel in order to prevent accidents?"

Mr. Woodcock (Cent. of N. J.) thought if a tire was tight it might safely be run a thickness of 1¼ inch, but if we are to break wheels and have accidents it was best to have a limit at which tires should be removed. He had as yet had no accidents from this cause, but he wished to be safe.

Mr. Eastman (Southeastern R. R.) thought the weight of the engine, the speed of the train, and the climate should determine the question. On his own road he had some 1¼ tires, but the engines were light and do not run fast.

Mr. Flynn (Western & Atlantic) had broken thicker tires than this on a 37-ton engine. The break was at 1½ inches strong. On a freight engine he had broken one at 1⅝. It was not cold weather, and he had thought of turning the tire again.

Mr. Barnett (Midland, Can.) was willing to turn an engine out in the spring when he could get 1⅜, but would not think this safe in winter. He had found very hard tires that had to be turned sooner than soft ones. This was probably because of a want of elasticity reducing the size of the area in contact with the rails.

Mr. Woodcock described a breakage in which a solid wheel broke through a spoke, although he had not considered the tire too thin.

Mr. Blackall (Del. & Hudson) had had tires break at 1½, 1¾ and even 2 inches, yet when he could get 1¼ after turning he turned them.

Mr. Graham (Lake Shore) had had 1 inch tires run to ¾ and 11/16, which were tight upon the wheel. These were Krupp tires. This was on a 6-wheel engine, weighing 80,000 pounds. He intended to run the tires till they broke, but had to take them out for other reasons.

Mr. Sprague (H. K. Porter & Co.) described a method of putting on tires upon taper centers and holding them with wedged bolts riveted over, a plan which he has been using very successfully for some time on narrow-gauge and light engines.

Mr. Lauder (Old Colony) saw no reason for the increased expense of this method. He had had no trouble with the ordinary method because he took care. If a 3-inch tire breaks it is because it is under strain. In putting one on, he heated by gas, expanded 1/16 of an inch, and had found no trouble. Several other gentlemen spoke of the cost and trouble of going back to the old way, and said as much accuracy was needed in putting a tire upon a tapered center as with the expanding method.

Mr. Johann (Wabash, St. Louis & Pacific) said he wished to get along with as little labor as possible, and as this plan called for more work he was opposed to it, especially because if the fit is not very good the engine will break down in a bad time. He had standard sizes for centers, which are made to steel gauges. All tires are bored to fit, and when an engine comes in he had taken off and put on a set of tires in three hours, which is certainly quicker than is possible with the other way.

Here the subject of a standard distance between flanges was brought up and it was proposed that the Association adopt the M. C. B. standard of 4 feet 5⅜ inches. Apparently it was about to be carried without debate, when Mr. Lauder proposed that it be made a limit standard instead of a fixed one, and be 4 ft. 5¼ in. to 4 ft. 5½ in. This would enable engine trucks to be changed end for end. This was adopted without further consideration of the subject or discussion of the best flange thickness. Nor was the position of the guard-rail taken up.

The report of the Committee on Boilers was then read. It was in one sense a continuation of the work done last year, and took up the subject where it was left at that time, using the drawings obtained last year, as well as many new ones, to illustrate the different points. This report was too long and too closely connected with the drawings to permit of even an intelligent synopsis being given. One feature, however, was particularly noticeable by its absence, at least to an outsider. The question of quantity of heating surface for a given engine, or for a given amount of work, was not taken up. The details of boiler construction were considered at the greatest length, but the key-note of the whole question, the number of pounds of dry steam which it is possible to get from an engine, was not even hinted at.

The discussion, however, was of great interest and covered a great variety of points. Mr. Blackwell's experiments in regard to the constitution of plates which had cracked were of interest and should be followed up. The remarkable feature he mentioned was that the chemical analysis showed more sulphur in the plates in the vicinity of the cracks than in other portions.

The English have had more trouble with steel fire-boxes than Americans have had, and it was suggested that perhaps the water might account for it, but to this Mr. Sinclair replied that none of the English roads have as bad water as is to be found upon some American lines, and this would not, therefore, account for the difference. Unskilled working will have to be charged with a part of these failures to work steel, and the use of a grade of steel too high for the purpose for the others. Some steel seems to be more sensitive to the action of hard water than others.

Mr. Johann abandoned the practice of annealing steel some six years ago, and has had no occasion to return to it. In straightening, he does not permit a hammer to be used upon the sheets, but uses either a wooden mallet, which he prefers, or a flattening tool. Weak spots will be produced at points where the hammer marks are seen. His plates are punched, and while drilling may be, and probably is, better, the punching produces very satisfactory results. Drifting is of course not permitted under any circumstances.

Mr. Sprague said that while he did not anneal, he was very careful not to permit flanges to be worked cold; or, if this had to be done the plate was heated and allowed to cool down.

Mr. Johann thought better water would be a paying matter in the reduction of repairs. In some places on his road he has to take out tubes after six months' use. If the managers would furnish good water the repair bills would be decreased materially. To prevent as far as possible the evil effects of bad water, the blow-off cocks of engines are arranged so as to be used while the engine is running, and the men are directed to use the cocks three or four times each trip.

Mr. Warren (Ind., Bloom. & Western) thought the water had more to do with the troubles than anything else, and cited a case where an engine which had required constant repairs was transferred from a division having bad water to another where it could have good water, with a marked and immediate reduction in repairs. Lime water, it appears to be proved, is more injurious to steel fire boxes than any other, and the same is true of sheets of any kind.

Mr. Wilder (N. Y., L. E. & Western) said he had been analyzing some of the waters from a Western connecting road, and in one case found a well which carried 42 grains of solid matter per gallon, yet to the sight this water was perfectly clear.

Mr. Fuller (N. Y., Penn. & Ohio) got the worst water from the streams. His steel fire-boxes last only a year, when they have to be taken out. The coal or water does the work, but the coal seems to be the worst. At several points the water carries as much as 42 grains of solid matter per gallon. An effort is being made to obtain surface water at points where water is bad.

In answer to a question, Mr. Sprague gave an account of a boiler compound he is using for the prevention of scale. It is made to suit the water he is using. Analysis is first made of the water by the company, which is located in Boston, and the compound prepared accordingly.

Mr. Wilder thought the coal had less to do with the durability of the boiler than the water had, and cited his Buffalo division where the water was good, but the coal bad, and where the boilers lasted well. He also called attention to the fact that it was chemically possible that there might be a number of injurious substances present in the water in large quantities, and yet they might neutralize each other to such a degree as to be comparatively harmless to the boiler.

The recommendations by the committee of wide water spaces, increasing as they go upward, and also for a ¾ inch space between the flues, were passed over without comment, beyond a suggestion that if more space was given and finer tubes used better results would probably be obtained.

The sixth and seventh points made in the report were: No inside ferrules to be used in tubes, and lap-welded tubes of iron or steel instead of those of composition.

Mr. Eastman said he had used galvanized iron for ferrules on one engine and as yet had had no leakage. The tubes were not swedged down.

In reply to a question, Mr. Johann said he used copper ferrules, cut from seamless copper tubes. They are made with a flange and put in with a Dudgeon expander.

The eighth recommendation, not to use a solid fire-door ring, was not debated.

In regard to the next point, Mr. Lauder said he thought it should read that each boiler be provided with as many washing-out springs as may be necessary.

Taking up the 11th point, Mr. Forney said the strengthening of the sheets at the dome opening was very important, and was often neglected. He cited the case of the elevated road, where they had had much trouble. In regard to these, an experiment was cited where it was found that under pressure these domes went down.

Mr. Sinclair pointed out that in this case the dome stays would only strain the sheets to which they were attached without adding strength.

Mr. Austin (Baldwin Locomotive Works) made an explanation of the construction of these engines, from which it was apparent that the staying of the dome and strengthening of the sheet to which it was attached had little to do with the trouble. The weights of these engines were cut down to a minimum, the shells were too thin, only ¼ in., and the shells were 34 in. diameter, with a 19 in. dome. The sheets, where they were flanged up into the dome, were only 5-32 of an inch thick. They were made as thin as this in order to secure lightness, which the managers deemed essential. He further said that when a proper thickness of shell is given, the flanging of both sheet and dome is good construction, and gives no trouble. As these boilers had flattened sides, it was to be expected that the pressure would tend to bring the shell to the circular form if the horizontal stays were insufficient.

Mr. Wilder said he flanged the sheet upward into the dome and used two rows of rivets. He stayed the dome to the crown-bars, spacing them 6 inches apart and took great care in the construction.

Mr. Johann had had none of the troubles mentioned by Mr. Forney, and thought that flanging the sheet up into the dome good practice, and gave sufficient security. He used 28-inch domes and had had no trouble with them.

The proposal to use rocking grates for bituminous coal called out no expression of opinion, but the 12th proposal, which was to leave the boiler free from the frame, and give up back braces even with slotted holes, was briefly discussed. One member said this was wrong, because when an engine is jacked up the frame is much strained when the brasses are taken from the jaws to drop the wheels, and the frame is liable to bend.

The general feeling appeared to be that it was best to use the injector or warm water test for boilers in the first instance, and after that test by hammer and inspection, but no remarks were made.

In regard to mud-drums, Mr. Sprague said they were out of date and he did not like to put them on.

Mr. Johann found them useless, and instead put on a bowl-shaped casting from which blow-off pipes are carried. The drum also carried a certain quantity of mud, and that was all it could do.

Mr. Setchel protested against blowing off under pressure, on account of the scale which it makes. His plan was to reduce the pressure till it was less than that given by the filling hose. Cold water is then turned on and the boiler blown out while the fresh water is coming in. This avoids baking the mud on the surfaces and the hard scale which the hot blow-off produces.

Mr. Wilder worked in much the same manner. The hydrant is turned on so soon as the pressure is low enough. The boiler is then cooled off gradually. There is no unusual strain brought upon the boiler, and the mud is blown out as well as if the boiler was hot. He fully agreed with Mr. Setchel in regard to the damage done by blowing off hot.

Further notes of the proceedings will be given in our next issue. We append the report of the Committee on Educating Young Men for Locomotive Engineers; also a valuable paper contributed by Mr. Angus Sinclair on Locomotive Fuel Economy.

FUEL ECONOMY WITH LOCOMOTIVES.

To the American Railway Master Mechanics' Association:

Gentlemen: During the last twenty years remarkable reduction has been made in the cost of moving railroad trains, and an important portion of the saving effected in transportation expenses is due to the labors of this association. While there is just ground for pride over past achievements, the work must still go on, for great progress must yet be made in the line of economy.

We have heard much said of late about the keen, close competition which our food producers are going to encounter in the near future from the breadstuffs raised by the cheap labor of Russia and India. A factor in this problem, perhaps more important than the original cost of production, is the cost of handling and transportation to market. The vital struggle in this race will probably be decided by taxing the ability of our railroads to make still greater reductions in the cost of moving the produce of our Western farms to the seaboard. As the locomotive department nearly always receives the first attention when a demand for reducing operating expenses arises, I shall endeavor to suggest how important savings might be effected without impairing the efficiency of the service.

Although the American locomotive compares favorably with the average stationary or marine engine in the economical application of power, there is still room for improvement, as can be proved by a comparison with the work done by locomotives in Europe of similar dimensions to ours, while doing similar work.

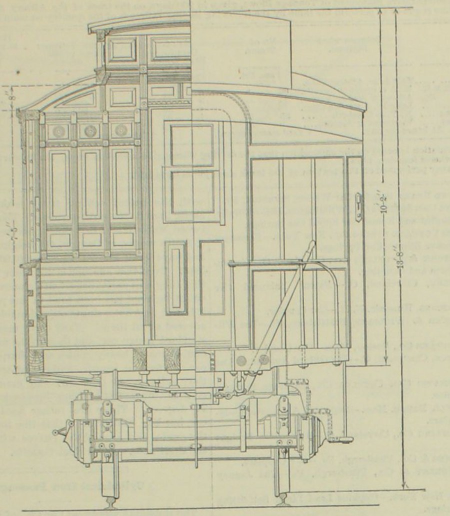
During the month of March last the engines running the Chicago Limited Express on the Pennsylvania Railroad, between Jersey City and Philadelphia, burned 63.35 pounds of coal per train mile. Some engines on other roads doing similar service, and burning bituminous coal, show a slightly better duty; but the Pennsylvania locomotive may be accepted as a fair average of American locomotive practice, with two or three notable exceptions. On a good representative road in this country a Mogul engine, with cylinders 18×24, pulling twenty-five loaded cars, on an average, burns 120 pounds of coal per mile. This may be considered among us fair economical work for a freight engine.

The famous Webb compound locomotive, on the London & Northwestern Railway, has been running a train of about the same weight and speed as the Pennsylvania Railroad's Chicago Limited Express over a road quite as hard to operate, with a fuel expenditure under 30 pounds to the mile. This engine may be regarded as having exceptional means for steam saving, but the best engineering authorities in England contend that its performance is no better than that of many good locomotives that are not compounded. The "Gladstone," a well-known engine belonging to the London, Brighton & South Coast Railway, having cylinders 18½×26, burns 31 pounds of coal to the mile, while running an express train weighing about 200 tons at a speed of forty-five miles an hour. From the record of work done by engines on the Great Northern Railway, I find that a freight engine, with cylinders 18×26, pulling a train similar to that handled by the Mogul, already referred to, and over a road whose physical features are nearly the same, does its work with a fuel consumption of 50 pounds to the mile. Many attempts have been made to explain away the unfavorable fuel record our engines make compared with those in Europe of the same size doing similar work, but these well-meaning attempts have not been convincing. If other engines are making a better record than ours, our best way towards equaling or excelling them is to recognize the truth and investigate the cause. Considerable experience with the running of locomotives on both sides of the Atlantic, leads me to believe the allegation, that greater expense is incurred in operating our locomotives than what is found necessary with British engines, to be genuine, and founded on undeniable data. I shall endeavor to point out some of the causes which I think contribute to this undesirable condition of affairs.

Proper investigation would probably identify several causes as contributing to the unfavorable record of the American locomotive. However good an engine may be, it is not likely to make an economical showing unless the men in charge are interested in bringing about that result. The American locomotive engineer and fireman are second to none following the same calling for intelligence and high character, but they are not trained up in the rigid ideas of fuel economy that prevail among the enginemen of Britain. There are roads here where strict economy is habitually practiced, but they are exceptional. The average fireman on the ordinary run of roads gives no heed to coal saving, his work being regarded as good so long as he keeps up the required head of steam. Before firemen can be blamed for this laxity, an examination of the means at their command to promote fuel-saving is necessary. An important item of heat waste is the steam thrown away through the safety valve. Now, what aid has the fireman received from the locomotive builders and designers in restraining this source of waste? The ordinary ash-pan is made without pretense at being air-tight, and to call its doors dampers is a delusion and a snare. There is also a greater evil in this than the mere loss of heat by steam blowing off. Firemen are prevented from learning the practice of regulating the admission of air to suit the fire, so they fall into the habit of making the fire suit the full admission of air.

Let us suppose that every pound of coal consumed in the fire

FORTY-FIVE FOOT PASSENGER COACH—C. C. C. & I. RAILWAY.



End Elevation and Section.

box is capable of generating 14,500 units of heat, combustion being effected by the oxygen taken from twelve pounds of air. In this case there would be thirteen pounds of mixed gases heated by the heat liberated from the single pound of coal, elevating the temperature to 4700 degrees Fahr. But locomotive fire-boxes, when the engine is working, need a liberal supply of air to effect complete combustion, and 18 pounds of air to the pound of coal is low for the intense draft of our engines. To heat up nineteen pounds of gas, one pound of coal will not raise the temperature higher than 3200 degrees Fahr.—a loss of 1500 degrees below the other, and every additional pound of superfluous air cools the gases of combustion in like proportion.

My object in adverting to this well-known fact is to allude to its practical effect on our loose methods of controlling air admission. When an engine is working with a heavy fire, more air is needed to penetrate the mass and effect combustion than what is necessary where a light fire is carried. But our practice is to give the same supply for both cases. The consequence is that an engine will not steam with a light fire, because the rush of air is so great through the thin coating of coal that the gases are chilled below the point of ignition. In approaching stations or long descending grades, firemen could often let the fire go light if they could regulate the admission of air by proper dampers as their compeers on British engines are enabled to do. This practice of permitting a free rush of air through locomotive grates at all times is responsible for more waste of fuel and damage to fire-box sheets than is generally recognized.

What appears to be another source of loss with us is the practice of using viciously contracted exhaust nozzles. When we reflect that induction of furnace draft by exhaust steam is subject to the same laws that regulate the induction of a current of water by the steam jet of an injector, it seems a curious spectacle to see the exhaust steam passed from the pipes through two parallel nozzles, neither of which can be central to the lift pipe or stack that the steam must use as an induction pipe. This I conceive to be a violation of the laws controlling induced currents, and its bad effects have to be remedied by resorting to means which entail other disturbing agencies. Any one who has tried to make an injector work when the internal tubes were out of line knows that he had a difficult job to accomplish. An engine with double nozzles is in the same position in regard to draft induction as the injector is in regard to its ability to throw water when the tubes are out of line. The exhaust steam does not go straight up the stack, acting like a piston to form a clean vacuum behind. Its tendency is to strike on the sides of the stack or pipe, breaking its unity, reducing its velocity, and leaving fragments of the volume behind. To overcome this obstacle to free induction, increased speed of exhaust steam is resorted to which is obtained by contracting the nozzles. This increased speed of exhaust steam is rendered necessary to prevent the scattering steam from destroying the vacuum in the smoke-box. This is not a mere hypothesis. It is the teaching of observation and experiment with engines at work.

The single nozzle is almost universally used in Europe. An ordinary engine with cylinders 17×24 inches will steam freely with nozzle 5 inches diameter, giving an opening of 19.6 square inches. On the elevated railroads of New York single nozzles are employed, and their standard engine with cylinders 11×16 inches steam freely with a nozzle 3 inches diameter, or 7 square inches area of opening. That cylinder has a cubical capacity of 1,520 inches. Where double nozzles are used their diameter for a cylinder 17×24 inches is about 3 inches. A cylinder of this size has a cubical capacity of 5,424 inches. So the steam from this large cylinder has to escape through an opening as small as that which induces draft to make steam from a cylinder less than ⅓ its capacity. The result of this system is that the ordinary locomotive suffers chronically from back pressure in the cylinders, due to unduly contracted exhaust orifices.

It may be said that a certain height of smoke-box vacuum must be secured to make an engine steam, no matter what kind of nozzles are employed. But facts do not substantiate that theory. Every one who has tried the two forms of nozzles knows that steam can be made freely with a much lower vacuum when a single nozzle is employed than in the case of double nozzles. And where a decrease of smoke-box vacuum is practicable a direct saving of fuel is effected through the fire not being torn up so much by the blast. This also permits a steadier fire-box temperature, since the current of surplus air is less fluctuating.

The only advantage claimed for the practice of using double nozzles, is that a single opening allows the exhaust steam from one cylinder to shoot over through the junction of the exhaust pipes into the other cylinder, causing more back pressure than contracted nozzles. This defect is due to a wrong pattern of exhaust pipe. Where the pipes are designed so that the steam is flowing in a nearly vertical direction before the junction of the pipes is reached, there is no trouble from it passing over into the other exhaust pipe. Indicator cards taken from the engines on the elevated railroads show no shooting over of the steam, and British locomotives indicate no loss from this source.

The practice very general in Europe of using driving wheels much larger than ours may have some influence on economy of heat. An engine running at a rate of 45 miles an hour having drivers 66 inches diameter, exhausts 15 times each second; an engine with drivers 84 inches diameter running at equal speed exhausts 12 times each second. The effect which the rapid exhausts have upon the fire appears to have received too little attention. When the period between the exhausts is long enough to admit the gases to flow with a pulsating motion, their speed through the flues must decrease between the exhausts. This would permit more of the heat to be abstracted for evaporation. Those who are in the habit of running engines up steep grades with heavy trains, know that so soon as the engine begins to move slow the generation of steam becomes exceedingly rapid, although the engine may be working up to its highest capacity. Heavy work done under such circumstances is performed very economically, which may be due to the slow exhaust permitting effectual absorption of the heat.

While I stand second to none in admiration of the many excellent qualities of the American locomotive, I think there is possibility of making it lighter on fuel. In working towards that end the points brought up in this paper may be found worthy of investigation.

ANGUS SINCLAIR.

EDUCATING YOUNG MEN FOR LOCOMOTIVE ENGINEERS.

To the American Railway Master Mechanics' Association:

Your committee, appointed at the last annual convention to report at this meeting on the subject of the "best mode and manner of educating young men for locomotive engineers," beg to offer the following report:

Considering this subject to be of vital importance to the Association and to the public in general and that proper care and attention have not been given to it in the past, the committee have spared no pains to get all the information they possibly could on this subject, knowing and feeling that men selected to fill the responsible position of locomotive engineers must possess faculties that, as a general thing, do not belong to all the human race; and as locomotive engineers have to be selected from the ranks of firemen, they feel that due care and caution should be exercised in selecting young men for firemen. Now, to arrive at a proper conclusion, one that would be satisfactory to the Association and to the railways of the country, your committee sent circulars to all the Master Mechanics in the United States, Canada and Mexico. We sent out 532 circulars, to which we received 76 replies, being on an average of one answer to every seven sent. Many of these replies contain very valuable information and were from many of the leading roads of this country, Canada and Mexico. Your committee beg leave to return thanks for the answers to their circular.

The opinions given us by the different Master Mechanics who replied were as follows: Five recommended that none but machinists should be locomotive engineers; nineteen thought nothing more was needed than to have a young man fire from three to four years with good competent engineers to make him a good runner; fifty-two thought that one year in the shop and round-house, with two to three years' firing, was necessary to make a cempetent engineer; many recommended that young men, while firing, read and study books that would give them a general knowledge of the locomotive, such as "Forney's Catechism of the Locomotive," and several other works of that kind. Many of the replies admitted that machinists would make the best runners if they would consent to fire one year after having learned their trade, as they would then have the advantage of knowing all about the construction of the locomotive. Of course, when speaking of that class of men, they meant bright, intelligent young machinists—men with nerve and energy, and quick to act in cases of emergency. Of course, there are some who would never make engineers, no matter what opportunities were given them. If young men of this kind would consent to run one year or more as firemen we could select our locomotive engineers from among that class; but they will not do it, from the belief that they are just as competent to run a locomotive as the best engineer on the road for which they are working, and if they are given an opportunity to run an engine they are certain to make a failure.

This being the fact, we are compelled to select our engineers from among the ranks of the firemen, as the best and safest runners. Now, this being the class of men from which we have to select our engineers, some uniform mode of instructing them for the responsible position that many of them will have to fill in the future will have to be adopted by the different railroads in America. Your committee would therefore recommend the following:

All Master Mechanics should have full control of the engineers and firemen in the employ of their respective roads, with full power to hire and discharge the same—of course, recognizing the rights that the General Managers or Superintendents have to order the discharge of any engineer or fireman for neglect of duty.

1st. The qualifications for the position of fireman on all the railways in America should be as follows: The applicant should be from 18 to 24 years old, able-bodied and in good health, with a good common school education and a fair knowledge of arithmetic, and of sober and steady habits. All applicants should be required to make application in their own handwriting, signing it in the presence of the Master Mechanic or the person he may appoint to hire that class of men. In selecting men for firemen great care should be exercised. The Master Mechanic should endeavor, so far as lies in his power, to select energetic, smart and active young men—men of nerve and presence of mind, quick to act in cases of emergency which may occur in the position they may be selected to fill in the future. If we select men of that kind there will be very little difficulty in educating them up to the proper standard to fill the place of engineers.

2d. There should be three grades of firemen, classed as Junior, Intermediate and Senior Firemen—the young man just commencing to be classed as Junior Fireman, and so on up to Senior Fireman; the Senior Fireman receiving the highest pay for his services, the others in proportion. When a fireman has fired four years and is worthy of promotion and fully competent to run a locomotive there may be no vacancies in the engineer force on the road by which he may be employed. In that case we recommend that he receive a small amount more per day than the Senior Fireman (say from 15 to 20 cents per day more), and ranked as Veteran Fireman. On the road which one of your committee represents in this Convention this custom has been in vogue for a number of years, and has worked exceedingly well. All the engineers on this road have been educated under this rule, and to-day no engineers in the country rank higher than they do.

Proper care should be taken in selecting young men for firemen as to their ability to distinguish colors in a practicable, common-sense way. We recommend that all railroads having a sufficient number of employés to justify them in doing so have a reading-room and library for their firemen and engineers, in which the other employés could participate. The library, to some extent, should consist of works on the locomotive engine that a man with fair education could understand. While we do not think it essentially necessary, still we believe it would be beneficial to some extent to let firemen work one year out of the four in the shop and round-house, so that they might obtain a more perfect knowledge of all the parts of the locomotive.

Young men consisting of the class we have mentioned are certain to make good runners, and there will be no difficulty, at the proper time, to select good junior engineers from among that class of men. All opportunities possible should be given firemen to get such knowledge of the theory and movements of the different parts of the locomotive as would be beneficial to them when they enter on their career as engineers. To accomplish this end monthly lectures might be given in the reading-room by men of good practical common sense, who fully understand what they are talking about. If possible these lectures should be given by one of the engineers. The firemen would learn more from him, as they would better understand what he was saying, he having formerly been one of them.

Your committee is convinced that if the mode recommended by them is adopted generally throughout the country that, if not all, a large majority of the firemen would be educated to a point from which there would be no difficulty in selecting men who will make good and reliable engineers.

3d. The fireman now being competent to run a locomotive, and being placed in charge of one, has yet some few things to learn that he did not have the opportunity of learning, from the fact that he was not running the engine. While he may run carefully and avoid accidents he has to learn to run his engine with economy in the consumption of fuel and the cost of repairs. To learn this and to give the young engineer an opportunity to become a first-class man in his occupation, we recommend there be three grades of engineers—first, second and third grades—and that the remuneration they receive be according to grade; the fireman just promoted ranking in the third grade; after one year's service he enters the second grade; when two years have passed he enter the first grade, and becomes a first-class locomotive engineer.

Your committee is confident that if the different railways in the country will pursue the mode and manner laid down in this report there will be no further difficulty in selecting good and faithful men to fill the responsible position of engineer. They recommend the adoption of this report.

Respectfully submitted,
JOHN H. FLYNN, }
J. N. LAUDER, } Committee.
C. K. DOMVILLE, }

ENTERTAINMENT.

The following programme for the entertainment of the members of the Master Mechanics' Association during the convention was arranged and carried out:

Tuesday Evening, June 17.—Promenade concert at Ocean Hotel, at 8 o'clock p. m.

Wednesday, June 18.—Excursion by steamer, leaving Long Branch pier at 1 o'clock p. m.

Wednesdag Evening.—Collation at Long Branch.

Thursday, June 19.—Special train to Beach Haven (by the courtesy of the Philadelphia & Reading Co.). Trains left Long Branch at 3 o'clock p. m.

Thursday Evening.—Beach Haven. At this place the Association and their friends became the guests of Chas. T. Parry, Esq., who entertained them at the Baldwin Hotel. Special train returned to Long Branch the next morning in time to meet all trains to all points the same day.

Carriages were at the call of the members of the Convention and their friends at Ocean Hotel, from 10 o'clock Tuesday morning 17th, until Thursday noon, 19th June.

The committees having the entertainment in charge were as follows:

Reception Committee.—Hussey, Howe & Co.; Otis Iron & Steel Co.; Manning, Maxwell & Moore; H. A. Rogers; L. G. Tillotson & Co.; Murphy & Co.; Detroit Steel & Spring Works; Standard Steel Works; Midvale Steel Works; Thos. Prosser & Son; Ramapo Wheel Works; Valentine & Co.; Clarence Brooks & Co.; Allen Paper Car Wheel Co.; National Car Spring Co.; Galena Oil Works; Signal Oil Works; Park Brothers & Co.; Wm. Jessup & Sons; F. W. Devoe & Co.; D. A. Hopkins; Manhattan Oil Co.; Nathan Manufacturing Co.; National Tube Works; American Tube Works Co.; Rogers Locomotive Works; Baldwin Locomotive Works; Cooke Locomotive Works; Pittsburgh Locomotive Works; Brooks Locomotive Works; Rhode Island Locomotive Works; Taunton Locomotive Works; Schenectady Locomotive Works; Grant Locomotive Works; Hinckley Locomotive Co.; Mason Machine Works; George L. Dickson; Aaron French & Co.; Henry R. Worthington; Steam Gauge & Lantern Co.; French Spiral Spring Co.; John W. Masury & Son; W. R. Ellis; George R. Meneely & Co.; H. G. Ashton.

Executive Committee.—Chas. T. Parry, Gen. E. S. Greeley, H. G. Brooks, Chas. A. Moore, Franklin Murphy.

Carriage Committee.—W. Brigham, John S. Silver, W. W. Snow, George L. Dickson, John H. Harris.

Committee on Music.—William Burnham, N. E. Chapman, Thos. Prosser, Jr., J. K. Bole.

Committee on Boat Excursion.—M. L. Hinman, George Morris, W. Sibley, Fred. Rogers; Henry C. Valentine, Clarence Brooks, C. P. Choate.

Committee on Special Train.—W. H. Bailey, William Woodcock, A. A. Dame, A. Pitkin, C. T. Ham, H. A. Little, James Lancey, W. F. Wagner.

Committee on Beach Haven.—Charles T. Parry, John S. Cooke, C. A. Otis, Chas. G. Ellis, R. S. Hughes, L. G. Tillotson, Chas. Miller, A. G. Darwin, D. A. Wightman, Wm. H. Fenner, Max Nathan, A. De Lano, W. W. Evans, Wm. Mason, Jr., P. I. Perrin, J. Seaver Page.

The general officers of the Committee were: C. Roby, Chairman; John H. Belcher, Secretary; William Toothe, Treasurer.

At a meeting held on a special train between Long Branch and New York, John H. Flynn presiding, the following resolutions were proposed and carried by acclamation:

Resolved, That the thanks of the American Railway Master Mechanics' Association is due, and is hereby most heartily tendered to Mr. Charles T. Parry, for his kind invitation for the members and their friends to visit Beach Haven, and for his splendid hospitality and generous entertainment of them while there; to Mr. J. E. Wootten, General Manager of the Philadelphia & Reading Railroad; to Mr. Blodgett, Superintendent of the New Jersey Southern Railroad; to Mr. J. J. Faro, Superintendent Tuckerton Railroad; to Mr. W. W. Stearns, Superintendent New Jersey Central Division, for courtesies in permitting them to travel by special train; to Mr. W. Woodcock, for his indefatigable labors to promote the comfort of those attending the meeting; to Mr. Mann, of the Boudoir Car Company, and to Mr. Talbott, for kindness in placing their private cars at the disposal of members.

ANGUS SINCLAIR, Secretary *pro tem.*

Inventions and Appliances Exhibited at the Master Mechanics' Convention at Long Branch, N. J.

ATWOOD HEMP CAR WHEEL CO., New York.—Hemp Elastic Steel-Tired Car Wheels.

LOCK NUT BOLT & IRON CO., New York.—Smith's Patent Lock Nut Bolts.

AJAX METAL CO., Philadelphia.—Locomotive, Car, Rolling Mill and Engine Bearings.

EUREKA CAST STEEL CO., Philadelphia.—Steel Castings for Locomotive, Marine and Stationary Engines, Rolling Mills, etc.

M. M. BUCK & CO., St. Louis, Mo.—Lightning Hose Coupling and Locomotive Head-Light.

HEWITT BOX LID CO., Chicago, Ill.—Hewitt Journal Box Lid for Passenger and Freight Cars.

UNITED STATES CONCAVE SPRING CO., New York.—Crucible Cast Steel Concave Elliptic Car Springs.

DWIGHT NUT CO., Springfield, Mass.—Lock-Nuts.

CHAS. F. LONG, AG'T, Philadelphia.—Hoit Double Spring Draw-Bar for Railway Cars.

BANNING BRAKE SHOE CO., New York.—The Banning Brake Shoe and Brake Head for Freight and Passenger Cars.

UNIVERSAL WRENCH CO., New York.—Wrenches with separable Teeth.

ROSS BRAKE SHOE CO., Buffalo, N. Y.—Improved Brake Shoe for Locomotive Engines.

FAIRBANKS & CO., New York.—Portable Forges and Blacksmith's Hand-Blowers.

HENRY ROBERTS, Hartford, Conn.—Woven Wire Car Seat and Back Springs.

MOTLEY & STERLING, New York.—The Sterling Car Journal Lubricator.

F. J. O'CONNELL, Chattanooga, Tenn.—Nolan's Safety Switch and Track Gauges.

UNION BRASS MFG. CO., Chicago, Ill.—"Orme" Government Safety-Valve.

AMERICAN BRAKE CO., St. Louis, Mo.—Steam Driver and Tender Brakes.

REPUBLIC IRON WORKS (Limited), Pittsburgh, Pa.—Republic "Kalamein" Sheet Iron.

PHILADELPHIA SMELTING CO., Philadelphia, Pa.—Deoxydized Wire, Tubing, Journal Bearings, Car Trimmings, etc.

L. FINLAY, Malvern, Ark.—Triple-Truck Freight Car.

SEIBERT CYLINDER OIL CUP CO., Boston, Mass.—Oil Cups for Locomotives, Marine and Stationary Engine Cylinders.

J. B. MCCORMICK, Cincinnati, O.—Gifford Automatic Car Coupler.

COWELL PLATFORM & COUPLING CO., Cleveland, O.—Cowell Platform and Coupling for Railroad Cars.

CARLOUGH AUTOMATIC COUPLER CO., Newark, N. J.—Carlough Automatic Car Coupler.

Exhibit of Inventions and Railway Appliances at the Car-Builders' Convention at Saratoga:

AJAX METAL CO., Philadelphia, Pa.—Locomotive, Car, Rolling Mill and Engine Bearings.

ALBANY MALLEABLE IRON WORKS, Albany, N. Y.—Malleable Iron Castings.

KING'S AUTOMATIC DOOR for Hopper Bottom Cars, Pittston, Pa.

HEIM LEATHER BELTING CO., Newark, N. J.—Leather Belts.

VULCANIZED FIBRE CO., Wilmington Del.—Flexible Vulcanized Fibre Dust-Guards and Oil Box Covers.

A. C. FERGUSON, Saratoga, N. Y.—Life Bridge or Protective Platform for Freight Cars.

UNION BRASS MANUFACTURING CO., Chicago, Ill.—Car Trimmings.

NOYES MANUFACTURING CO., Boston, Mass.—Noyes' Metallic Condensed Cooler for Hot Journals and Car Axle Dust-Guards.

GEO. M. DENISON, New London, Conn.—Denison's Cooling and Lubricating Compound for Hot Journals.

GEO. R. MENEELY & CO., West Troy, N. Y.—Hopkin's Patent Self-Fitting Journal Bearings for Railway Cars and Engines, Brass Machinery Castings, etc.

S. H. & E. Y. MOORE, Chicago, Ill.—Freight, and Baggage Car Door Hangers, Differential Pulley Blocks, etc.

HOWE GRATE CO., Scranton, Pa.—Howe Culm Grate, for Culm, Anthracite and Bituminous Coal.

FAIRBANKS & CO., Albany, N. Y.—Section Hand-Cars, Bridge Gauge Cars, Push Cars, Narrow Gauge Hand-Cars and Railway Velocipedes.

BANNING BRAKE SHOE CO., New York.—Banning Brake Shoes.

CONGDON BRAKE SHOE MANUFACTURING CO., Chicago, Ill.—Congdon Brake Shoes.

AMERICAN BRAKE CO., St. Louis, Mo.—Automatic Freight Car Brake.

WIDDIEFIELD & BUTTON, Uxbridge, Ont.—Automatic Freight Car Brake.

The Gibbons Boltless Rail Joint.

An error having occurred in the record of service of this joint, as printed in our last issue, we now give a detailed statement of same as furnished by the company, as follows:

Approximate comparative Statement of Tonnage Blows, given in 200 days, on the track of the Albany & Susquehanna yard at Albany; also time required to perform the same by the following leading railroads of the country on main line:

Name of Railroad.	Between what Stations.	No of Trains.		No of Cars to Each Train.		Approx. Tonnage Blows in 200 days.	Time required to perform A. & S. Yard Record.	Single or Double Track.
		Pass.	Frt.	Pass.	Frt.			
* Albany & Susq	Main Line, Albany Yard.	*250		*1,000		5,700,000	200	Single
‡ N. Y. C. & H.R.R.R.	N. Y. & Spuyten Duyvil	60	8	6	35	2,590,000	439	Double
Do. Do.	Albany & Schenectady	11	—	9	—	483,000	2,335	Four
Long Island	Long Isl. & Garden City	14	5	9	30	995,000	1,148	Double
Phil. & Reading	N. Y. & Elizabeth	35	10	9	30	2,328,000	481	——
Albany & Susq	Worcester & Oneonta	8	32	5	20	2,570,000	440	Single

* Approximate. 24 hours per day. † Yard-master record. ‡ Taken from Time Tables.

The above calculation is based on the supposition that the driving wheels give a ten-ton blow, the forward trucks, two-ton, and tender and car wheels four-ton blows.

Little or no labor performed on this portion of the track since joints were laid.

HOWE IMPROVED BRAKE RIM for Car Wheels, Scranton, Pa.

DIAMOND STATE CAR SPRINGS CO., Wilmington, Del.—Elliptic, Hebbard, Edge-Rolled and Round Bar Spiral Car Springs.

UNITED STATES CONCAVE SPRING CO., New York.—Passenger and Freight Concave Elliptic Car Springs.

COWELL PLATFORM & COUPLING CO., Cleveland, O.—Continuous Floor Platform and Coupling.

JAMES HORSLEY, Cleveland, O.—Patent Balanced Car Coupler.

L. & G. P. STEBBINS, Hinsdale, N. H.—Car Coupler.

GEO. W. HOOKER & WILLIAMS, Brattleboro, Vt.—The Williams' Coupler.

UNION CAR COUPLER CO., Boston, Mass.—Car Coupler.

J. B. MCCORMICK, Cincinnati, O.—The Gifford Automatic Car Coupler.

ARCHER AUTOMATIC CAR COUPLER CO., Saratoga Springs, N. Y.—Car Coupler.

HENRY MITCHELL, Boston, Mass.—Improved Automatic Coupling for Freight Cars.

AMES CAR COUPLING CO., Cleveland, O.—Automatic Freight Car Coupling.

WILSON, WALKER & CO., Pittsburgh, Pa.—Car Couplers.

MCCONWAY, FORLEY & CO., Pittsburgh, Pa.—The Janney Car Coupling.

D. A. HOPKINS, New York.—Hopkins Lead Lined Self-fitting Car Journal Bearings.

ALLEN PAPER CAR WHEEL CO.—Paper Car Wheels.

ATWOOD HEMP CAR WHEEL CO., New York.—Hemp-packed Steel Tired Car Wheels.

PAIGE CAR WHEEL CO., Cleveland, Ohio.—Wrought Metal Car Wheels.

BENNETT'S CAR BRAKE CLUTCH, Scranton, Pa.

ELASTIC PACKING MANUFACTURING CO., Jersey City, N. J.—Elastic Fiberized Packing for Journal Boxes.

HALE & KILBURN MANUFACTURING CO., Philadelphia, Pa.—Elastic Slat, Rattan Spring, and Spring Edge Car Seats, and Parlor Car Chairs.

GARDNER & CO., New York.—Perforated Veneer Chairs and Chair Seats; Railroad Car Seats.

HENRY ROBERTS, Hartford, Conn.—Woven Wire Car Seats and Seat Back Springs.

MARDEN CAR BRAKE CO., Boston, Mass.—Steel Brake Beam and Malleable Iron Brake Head.

GRANULAR METAL CO.—Boston, Mass.—Granular Babbitt Metal Journal Bearings.

LOCK-NUT BOLT & IRON CO., New York.—Smith's Patent Lock-Nut Bolts.

ASPHALT CAR ROOFING CO., New York.—Asphalt Paper Roofing for Cars.

HOIT DOUBLE SPRING DRAW-BAR, Philadelphia, Pa.

E. MIGNAULT, New York.—Universal Angular Knuckle Joint.

E. B. MEATYARD, Lake Geneva, Wis.—The "Acme" Freight Car.

L. FINLAY, Hot Springs, Ark.—Three-Truck Freight Car.

STANDARD LIGHTNING CO., Cleveland, O.—New Portable Oil Railroad Light.

MANN BOUDOIR SLEEPING CAR CO., New York.—Sleeping Car, "Il Trovatore."

NEW YORK, LAKE ERIE & WESTERN R. R. CO.—Car fitted with the Pintsch System of Lighting.

S, H. MOORE, Chicago, Ill.—Freight Car Spark-Tight Door.

A number of railway supply and manufacturing concerns were represented at the convention, but having no samples of their products upon exhibition, their names do not appear in the above list.

Finlay's Central Support Truck.

Every one who has visited Hot Springs (Ark.) and noticed the rolling stock of the Hot Springs Narrow Gauge railroad has had his attention attracted by the long and peculiar looking cars with "Finlay's Patent" printed upon their sides. These cars are 36×8 feet, and besides the usual trucks at each end have their center supported by Finlay's patent truck. The necessity for this lengthening and strengthening of cars has been felt for some time, and has been caused by the noticeable fact that the gradually increasing weights which were being crowded into cars was becoming too much for the standard axles and bearings, to say nothing of the injury done to joints and rails. The great difficulty opposed to the supplemental truck has been the unavoidable tendency which such a truck, with the ordinary axle, would have to bind on the rail in passing around a curve. Mr. L. Finlay, the ingenious Master Mechanic of the Hot Springs railroad, has succeeded in overcoming this difficulty by means of a neat contrivance. The truck is provided with a lateral or sidewise motion, sufficient to allow the car, of which it is such a material factor, to pass around the shortest curves without the slightest inconvenience; indeed, it is asserted that cars with the patent central truck make the curves much easier than do the ordinary ones. The cars now in use between Malvern and Hot Springs were built by the Barney & Smith works, of Dayton, O., weight 21,000 pounds each, and have been known to carry 40,000 pounds at one car load. Even that amount is not their limit, for it is stated that they will carry considerable more. The superintendent of the road has been loud in his praise of the car, and it is said that not a single objectionable feature can be discovered about them. They carry more than the ordinary standard gauge car, and though the road is noted as being one of many heavy grades and sharp curves, the patent car, 36 feet in length, makes its trip full as easily as the ordinary 23 foot car. In many cases the grades run to three feet in one hundred, and the curves to 24 degrees. These are rather hard on the ordinary car, but Mr. Finlay says that the long car passes over the grades and around the curves with greater ease than the short ones.—*Little Rock Gazette.*

Cylindrical Iron Passenger Car.

The Robbins Cylindrical Car Co., of Boston, are building an iron passenger car which is at present about half completed. We copy the following description of the car from the company's printed circular:

> This car is designed to supersede the ordinary wooden passenger car now in use upon steam railroads. Being made of steel or iron, and cylindrical in form, it is more durable, stronger and better adapted to the constant strain and concussion incident to railroad traffic, than other cars. Above and beyond this, it is built with a view to lessen the liability to injury of passengers in case of accident, a need long felt, but not until now obtained. The form and material used are two great factors which enter into the construction of the car to obtain this result, but with them is added additional security to passengers from injury by fire, the furnaces being attached to the bottom of the car, the heat from the same being transmitted by radiation through pipes beneath the floor, and the floor itself. The interior—sides and top—are heavily upholstered and the floor carpeted, so that a fall occasioned by the car leaving the track and overturning will be attended with less serious results than now, with a chance in favor of a person coming out of the wreck unharmed.
>
> Another important feature of this car is the thorough system of ventilation obtained by the admission of fresh air through the monitor top, which is conveyed down below the floor through the hollow iron ribs running around the body of the car, where it is warmed and passed into the car through registers, and thence up and out through ventilators in the roof. The lighting of the car is provided for by the use of compressed gas, which is stored in reservoirs on the outside, and near the base of the car running legthwise, which also act in a double capacity, as do the hollow ribs—the former giving strength longitudinally, as the latter do circumferentially. To guard as much as possible against accident by telescoping, each end is made double, and the platforms consist of a series of iron plates, set on ends, between which is a filling of compressible material, which, when the coupling bar is crushed, acts as a great cushion, yielding gradually, breaking the shock, gathering up and receiving the momentum of the car before it comes in contact with the next car. Thus it will be seen that the safety of railway travel is enhanced. The form, and material of which the car is composed gives it strength and durability. The compressible platform provides against disastrous results from collision, and the upholstery against injury by being thrown about.
>
> From reliable estimates we are warranted in the statement that the car can be built for a sum not exceeding that now paid for a first-class wooden car, and that the weight will be from four to eight tons less, which, in an ordinary train, will allow of one more car being added, with no increase of motive power. This style of car is also adapted to postal, baggage, freight, dump and horse cars, which can be built on the same general plan, with a corresponding reduction in weight and at no greater cost.

THE recent death of Mr. Osgood Bradley, the noted car-builder of Worcester, Mass., takes one more from the ranks of men prominently identified with the early railroad interests of New England. Mr. Bradley was induced, in 1835, to turn his attention to the making of railway cars. The first cars that Mr. Bradley built were for the Boston & Worcester and Boston & Maine Railroads, just then going into operation. He also built the first cars for the Western (now the Boston & Albany) Railroad, and for several years built all the cars used on the latter road, until that corporation started a shop of their own. The first two eight-wheeled cars he built were for the New Bedford & Taunton Road. He subsequently made cars for all the principal roads in the country, the first of the more expensive ones being the elegant compartment cars he built in 1868 for the Boston & New York Steamboat Line, through Worcester and Norwich, the cost of which was $15,000 each. Growing up with the railroad business, and seeing its wants with its development, he was ever prominently connected with the construction and operation of the thousands of miles of railroads now being run in this country. Among the railroad men with whom he was associated he enjoyed a high reputation for business integrity.—*Pathfinder.*

EXTENSION SMOKE BOX—ASHLAND (KY.) COAL & IRON RAILWAY.

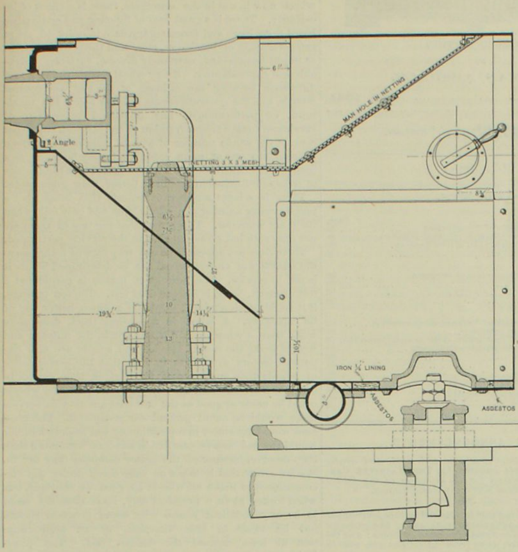


Fig. 1.—Longitudinal Section.

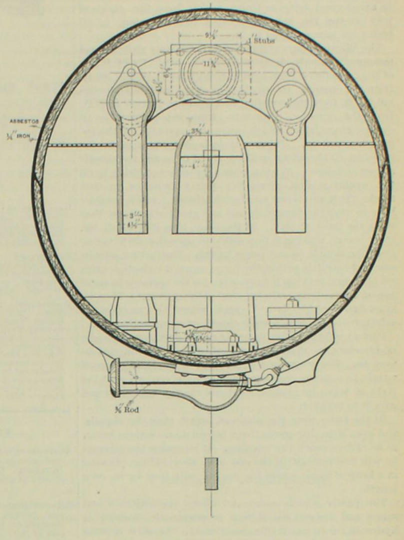


Fig. 2.—Cross Section.

The extension front shown in the cuts is that used by the Ashland Coal & Iron Railway Co., of Kentucky. It has some details of construction which are novel and worth consideration. Fig. 1 shows a longitudinal and Fig. 2 a cross section of the front. The deflector plate at the bottom is some 10 inches from the bottom of the smoke box, and much further from the flue sheet than usual. The object of this is to secure a more uniform draft, and thus insure better steaming of the boiler. This is secured with an increase of ⅜ of an inch in the diameter of the exhaust nozzles, which the company has found to be an advantage resulting in an economy of fuel and incidentally reducing to a certain extent the back pressure. They are using 3⅝-inch nozzles on 16×24-inch mogul freight engines. The smoke box has a lining of asbestos, held in place by a ¼-inch iron plate. This plate or lining is made in a number of pieces, each one of which is made small enough to pass through the smoke box door. This enables repairs to be made upon engines having the extension without taking off the front. The lining can be put on new engines with equal ease. The original idea of this lining was to protect the outside of the box in case the front should take air and the sparks take fire, and thus increase the trouble. It has been found, however, that there are other advantages. If there should be any leaks it stops them, and in addition it keeps the outside sheet so cool that the frequent painting of fronts, in order to have them in harmony with the boiler, is entirely avoided. With this lining the fireman is able to keep a brilliant polish on his front by an occasional application of tallow. The company has found that the lining pays for itself in this way alone. It has the still further advantage of being cheap.

The cinders are blown through a goose-neck as they are pushed down, and pass off to one side of the engine. A four-foot galvanized iron pipe is slipped on to carry them well away from the engine. This avoids the trouble of grit and dirt in the bearings and gear, as is the case when the sparks are blown out under the engine. To prevent the sparks from getting into the steam pipe when not in use, and thus causing time to be lost in opening it when it is desired to blow out, a ⅜-inch rod is inserted in the pipe. This is withdrawn, leaving the hole perfectly clear when it is desired to blow out. This is shown in the cross section as a solid line continuing the nozzle of the blow out steam pipe. Three minutes only are needed to blow-off the sparks collected in one day's run of 100 miles on a freight engine.

The arrangement is very simple in all its parts: The deflector is held by a 2-inch angle iron and the netting fastened upon the upper side and carried forward to the front end. A man-hole in the netting is provided for convenience. The nozzles come just above the netting, and are about one diameter of the stack from its base.

Mr. E. M. Roberts, the Master Mechanic of the road, considers this the most perfect spark arrester now in use.

A Trip on a Fast Locomotive.

Having occasion lately to pass over some branches of the Philadelphia & Reading Railroad, a permit to ride upon the locomotives gave me opportunity to observe some striking points as to their work and wear.

At Bound Brook the Philadelphia & Reading Railroad joins the Central of New Jersey, forming the Bound Brook line between Philadelphia and New York. South of that point Wootten locomotives are used on fast trains. North of it, standard Baldwins. The train leaving Philadelphia at 7:30 a. m., engine 364, makes the run to Jersey City in one hour and fifty minutes, schedule time, including some eight or ten stops and "slow-ups." A stretch of 17 miles between Princeton Junction and Bound Brook, including two slow-ups and one stop, was run in exactly 17 minutes. Of these 17 miles, 11 in succession were run in nine minutes and ten seconds, being a rate of 72 miles per hour. And of these 11, two successive miles were run in 47 seconds each, being a rate of 76.6 miles per hour. This was the regular daily run; we were not behind nor making up time.

Even at these high speeds the engine ran about as smoothly as a first-class car. I have many times experienced severer vertical and lateral oscillations in such a car on reputable roads at 45 miles per hour. So smooth, indeed, was the run, that instead of any nervousness as to the safety of such speeds, the query constantly suggested was: Why may not a higher speed be obtained with entire safety? Or is there anything to prevent it but the problem of making the requisite steam?

In fact, safety at high speeds is aimed at in these engines, oddly enough, by placing the centre of gravity very high—perilously high it at first appears; but when it is considered that the higher the inclination of the lines from the center to the rails, within the limit of safety from capsizing, the more lateral shocks will be eased by the springs, then it ceases to be a wonder that lateral oscillations are so little felt, for the reason that as sudden shocks they cease to exist. And take away the sudden heavy impact of the flange of the wheel laterally against the rail, and the danger of the wheel climbing the rail is taken away.

The firing and steaming of these engines is to be noted also, as they are the prime condition of the high speeds. The fire box is placed above the level of the top of the drivers, and extending out the full width of the engine, overhangs them. An immense grate surface is thus obtained. Water tubes traverse the mass of fuel fore and aft, promoting circulation. The crown sheet is separated from the fire box by a wall of fire-brick rising above the level of the fuel, and by a hot air or flame chamber between it and the fire-brick. The crown sheet holds the largest number of the smallest brass tubes I ever saw in a locomotive boiler.

The force of the blast being expended through so broad an area of fuel, the velocity of the air current through it is reduced, and as a result, but very little cinder, and that the finest, is ever drawn through the tubes. True, a spark-arrester is placed in the smoke box—to comply with the law—but it arrests nothing, for nothing coarse enough to be arrested by it passes through the tubes; in other words, the stuff is all burned up in the fire box. The fact that these boilers are able to utilize what is known as "buckwheat" size coal, making steam very feebly with it, is a strong point in their favor.

Notwithstanding the rapid evaporation effected—as high as 47 gallons per minute—they are not flighty. In the entire run above referred to the gauge did not vary three pounds from 135, due in part, perhaps, to an occasional blow-off, while slowing in to the water-tank.

On the return from New York, I rode to Bound Brook on a Baldwin engine, No. 165, having a remarkable record, viz., that of having run 119,360 miles consecutively, without any general repairs, her weight not having once been lifted from her drivers in that period.—*Cor. Scientific American.*

Railway Crossing Signals in Indiana.

Auditor-General Rice, of Indiana, ha written an official letter approving the Westinghouse system of pneumatic and electric crossing signals tested last week at Hammond, Ind. The auditor expresses entire satisfaction with the system as being perfectly safe, and gives consent, in accordance with the authority invested in him by the statute, to the use of this system by the roads where tracks cross at that point without stopping trains at the crossing. As soon as General Superintendent E. C. Brown, of the Michigan Central, can consult with General Manager Lewis Williams, of the Nickel Plate, and General Superintendent J. C. Williams, of the Chicago & Atlantic, concerning some details which have not yet been arranged, the roads will accept the plant at Hammond and commence its use.

The Union Switch & Signal Co., of Pittsburgh, has made contracts for putting in the same system of signals and switches at the Union Stock Yards, Chicago, where the Lake Shore and Rock Island roads, each with a double track, cross the stock yard tracks, and also at Valparaiso, Ind., at the crossing of the Chicago & Grand Trunk with the Nickel Plate and Fort Wayne roads.

The system at Hammond is quite similar to the one in operation at Wellington, O., which was examined by the last Michigan Legislature before it passed the law allowing railroads to dispense with stopping trains at crossings where such a system is in use, provided it is first approved by the Commissioner of Railroads. A similar law has been passed in Indiana also. But as that State has no Commissioner of Railroads, the approving power is given to the auditor. The test yesterday was made especially for the benefit of Auditor Rice. That officer expressed entire satisfaction with its working, but reserved his official opinion, which will be communicated to the roads interested in a day or two. In case he approves of it the roads will be saved great delay, as trains which have the right of way can run the crossing without first stopping, as all trains are now required to do.

The Westinghouse system consists of safety switches and semaphore signals, all operated by one man. On each side of the crossing on each road is a short safety switch 400 ft. from the crossing, terminating in a sand bank, a home signal 500 ft. from the crossing, and a distance signal 2,000 ft. from the crossing. One mile from the crossing is an electric enunciator, which warns the operator of the approach of a train. Unless a train is ready to run to the crossing, all the safety switches stand open and the signals are set at danger. When a train approaches on either track the operator first closes the safety switches on that track. This act closes an electric circuit, which enables him to drop the danger signals and give the train on that track the right of way. At the same time it locks all the other levers, making it impossible to open the switches or clear the signals on anv other tracks. The instant a train enters the section within the home signal it locks the entire set of levers, making it impossible for the operator to move one of them till the train has cleared the crossing. Then he must first raise his danger signal before he can open the safety switches, which were closed, or open another set.

Perfect safety is thus insured, as the operator can make no blunders, no matter how confused or how hurried he may be. The track must be set right before he can permit a train to pass the crossing, and having given one road the right of way, he cannot suddenly change his mind and give it to another.

At the same time the engineer must obey the signals, and even if he disregards them he can do no serious harm, as he cannot reach the crossing. If he makes the attempt he will find himself at the end of a short siding, plowing in a heap of sand, where his engine will stop in its own length.

The power which opens and closes the switches and raises and lowers the signals is pneumatic, instead of hydraulic, as in the Wellington system. At each moving point is one air chamber provided with a V valve very similar to an ordinary steam chest. This valve is thrown from one position to another by pressure from a small tube filled by a non-freezing mixture of alcohol and water. The pressure required to move the valve is very slight, being applied by the operator by means of a small lever, which requires so little space that a dozen could be operated by one man without moving his position. Electricity does the rest, providing the locking power and insuring perfect safety. The moving of one lever the least bit locks all the others. At the same time the danger signals cannot be cleared until the switch lever is moved to its full extent, and the switch is moved to its place and locked there. A piece of wood or any obstruction which prevents the switch from coming entirely over, prevents the lever which moves it from coming to its place, and renders it impossible to give a train the right of way until the obstruction is removed and it can cross with safety. By a very simple little device the distance danger signal can be raised when the home signal is down, thus detaining a second train until the first on the same track has cleared the crossing.

Commissioner Innes expressed entire satisfaction with this system, and will favor its adoption in all the more important crossings in this State. He thinks that it leaves nothing to be desired, and that the only thing which stands in the way of its general adoption is its cost.

At the same time the Commissioner is determined to find some system of uniform crossing signals which shall be moderate in cost. He is now having prepared plans for a set of crossing gates similar in operation to the interlocking switch system.—*Detroit Free Press.*

THE Master Mechanics' Association, at the Long Branch meeting, elected the following officers: President, J. H. Flynn, Western & Atlantic; First Vice-President, J. D. Barnett, Midland, of Canada; Second Vice-President, Wm. Woodcock, Central Division, Philadelphia & Reading; Secretary, J. H. Setchel, Ohio & Mississippi; Treasurer, George Richards, Boston & Providence. Mr. Setchel enters upon his fifteenth year as Secretary.

Automatic Couplers.

The impression has been produced by the reports published in the newspapers of the proceedings of the late convention of the Master Car Builders, that Mr. M. N. Forney was appointed by the Association to make an investigation of the merits of automatic car couplers. We are requested by that gentleman to say that no such appointment has yet been made, and that all that was done by the Car Builders' Association was to refer the matter to the Executive Committee, with authority to have such an investigation made if the railroad companies would pay the expense of it. Whether or not they will be willing to do so has not yet been ascertained. At any rate, Mr. Forney has not, and probably will not, undertake an investigation of the vexed car-coupler question, and until he does, inventors of such appliances who write letters to, or seek interviews with him, will waste his time and their own too. They are requested by him to do neither.

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EDITORIAL ANNOUNCEMENTS.

Addresses.—*Business letters should be addressed, and drafts and money orders made payable, to* THE NATIONAL CAR-BUILDER. *Communications for the attention of the Editor should be addressed* EDITOR NATIONAL CAR-BUILDER.

Advertisements.—*Nothing will be inserted in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *The editorial department will contain our own views and opinions; and the rest of the reading matter, aside from advertisements, will be such as we consider of interest to our readers.*

Contributions.—*Articles relating to railway rolling stock construction and management, and kindred topics, by those who are practically acquainted with these subjects, are especially desired. Also early notice of changes in railroad officers, organizations and names of companies.*

Special Notice.—*As the* CAR-BUILDER *is printed and ready for mailing on the last day of the month, advertisements, correspondence, etc., intended for insertion, must be received not later than the 25th day of each month.*

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WILLIE H. GRAY, 306 *Olive Street, St. Louis, Mo.*
ROBERT CLARKE & CO., 65 *West Fourth Street, Cincinnati, Ohio.*

CHILLED IRON CAR WHEELS.

The increase in the weight of freight cars and their loads, together with a still greater prospective increase in both, is forcing the question of the future utility of chilled iron car wheels into special prominence. The chilled iron wheel is an exclusively American product. Millions of them are now running on our roads, and until a comparatively recent period their record of service has been a very satisfactory one. Within the past year or so, however, there has been a good deal said in a vague and random sort of way about breakages, but without any very precise or definite data to warrant it. These alleged breakages, when considered in connection with the increased weight that wheels are now carrying, suggest a relation of cause and effect as between the two conditions. If good iron wheels have been strong enough in the past, they ought to be strong enough for the same amount of service now, and they are so, no doubt. But it is a grave question whether they are equal to the new demand upon them; and as car loads are not likely to grow lighter, some means must be devised to bring the wheels up to their work. The chilled tread is the great feature of the cast-iron wheel, and the advantages of this feature are not likely to be given up because the economy of traffic requires heavier car loads.

The question is, can the capabilities of iron wheels be increased, and can they at the same time be made approximately uniform in quality and capacity of service, instead of exhibiting as they now do the greatest diversity in these respects? We should unhesitatingly say, yes. We think that with proper attention to the materials and their manipulation, wheels can be produced so uniformly poor that after running 12,000 or 15,000 miles they would be fairly worn out. If this can be done, why not determine in the same way what the materials and manipulation shall be for the production of wheels that will run 200,000 miles? Both kinds are made now, and the intermediate grades also, apparently to meet the sliding-scale of prices; but the general mileage average is very much lower than railroad men wish it was, and as a curious coincidence, the prices are also very much lower than the wheel makers like to have them.

With respect to the actual service performed by car wheels now in use in the aggregate, there is a chaos of incertanty. There is a great deal of figuring and estimating based upon loose and fragmentary data in order to get at the percentage of breakages, etc., and the results are, as as might be expected, extremely diverse, variable, unreliable and contradictory. Every wheel report shows a vast difference between the mileage of the best and poorest wheels, and the general average falls far below the maximum of performance. The estimated proportion of breakages ranges from a fraction of one per cent. to five per cent. of the whole number of wheels running for a given time on any one or more roads that may be taken as a basis for the calculation, but these estimates, in the absence of reliable information are little better than guess-work.

There is a large number of wheels that break, but a much greater number run a long time and only fail when they are worn out. This proves that the best of them are not only safe but economical as to the service performed.

There does not appear to be any way by which the essential qualities of an iron wheel can be determined before it is put in service. The mileage it makes is considered a test of merit, but it is not the final test. The ton mileage, if it could be ascertained, would be a much better test of its capability. A wheel in a 4-wheel truck does more work than a wheel in a 6-wheel truck, the mileage and weight being the same. Grades and speeds are also important factors, so much so in fact, that the performance of wheels upon any one road for a given time cannot be taken as a criterion for all roads. If all cast iron wheels could be made as good as the best that are now in service there would be small ground for complaint. The good ones would not suffer in reputation by bad association, nor would the bad ones be credited in advance with more than they deserve, because of the better company they are in. We are aware that it is not an easy thing under the circumstances to make all wheels as good as the best, but when looked at in a practical way, there does not seem to be any sufficient reason why some progress should not be made in this direction, or an approximation at least toward the desired end. The physical and chemical properties of irons and the processes of manufacture requisite to produce a wheel that will run 150,000 miles or more, are not so entirely things of conjecture as to defy analysis in this age of scientific research and investigation. What are the primary elements and their proportions, the chilling qualties, tensile strength and ductility of such irons? And should there be a moderate quantity, or any quantity, of old wheel scrap put into the mixture in order to produce a wheel as good as the best? It is said that a car wheel during the process of its manipulation is subject to a variety of mishaps, a single one of which will seriously impair its capacity for service, no matter how good the irons themselves may be that go into the cupola. If this is so, and if there can be no analysis that will determine the qualities of irons with reference to their suitableness for a good wheel, nor whether a little old scrap may or may not be used to advantage, it is difficult to see that anything better can be done than to keep on in the old rut—making very poor wheels and very good ones, with the intermediate grades, and average the mileage and breakage from such loose and disjointed data as can be obtained.

Both wheels and axles must be adapted in size, weight and strength to the loads they are to carry. If the loads are doubled, and the speed increased also, the strength of the foundation structure of the cars must be increased correspondingly. There is little discussion about the quality of the material that goes into axles, because it is very well settled what it should be, and the axles themselves, unlike wheels, can be fairly tested as to their capacity before being put into service. There are no estimates to speak of, of least, greatest and average mileage of axles. It is admitted that when the weight per journal has been increased, as it has been from 4,000 to 9,000 pounds, with more to come, the axles must be made heavier or else of better material. The maximum increase in the weight of iron axles has been about 70 pounds, and the weight of 33-inch iron wheels has been increased about 50 pounds, which is not equal to the increase in axles, considering the difference in the strength of materials. Both will have to be brought up to a still higher figure, especially the wheels. Will this make the wheels cost more to manufacture and raise their price to the users? On general principles we should say that it would. But cast-iron wheels appear to be an exception. The run of prices for a year or two past seems to indicate that the heavier the wheel and the greater the weight it has to carry, the lower the price at which it can be manufactured. The only explanation of this phenomenon is, that the wheels are made of cheap materials, and although they may do good service until they are worn out, they are more likely to fall short of the guaranteed mileage than if made of better material.

In respect to breakages, it does not appear, so far as the evidence goes, that chilled wheels made of the best irons are any more liable to break than steel-tired wheels. Both kinds do break, but until the records of breakage are more systematic and reliable than they now are, it will be impossible to strike a balance in favor of either.

THE MASTER CAR-BUILDERS' CONVENTION AT SARATOGA.

The number of members in attendance was larger than usual, which is a gratifying indication that there is no falling off in the interest felt by railroad men in the doings of the Association. A careful examination of the reports made by committees, and the discussions and action which followed, does not, however, create the impression that any very marked progress was made towards a final solution of any one of the important questions that have from year to year been the subjects of inquiry and investigation. It may be said, in fact, that so far as results are concerned, these questions remain as unsettled as ever, not because the Association is incompetent to deal with them, but because the difficulties to be overcome are of such a nature that the more closely they are grappled with, and the more urgent the need of a decision, the more formidable they become. This, we know, has been the experience of the Association from its beginning to its reorganization two years ago. Whether under its new departure its efforts to remedy the evils that seem to be inseparable from the voluntary system in which diversity has thus far been the rule, will be more successful than in the past, will be apparent in a year or two perhaps. Certain it is, that the tenor of the committee reports and discussions at Saratoga unmistakably indicates that a great deal yet remains to be done to reconcile discordant views to such an extent as to agree upon any united action except what is merely preliminary to some anticipated final action to be reached by and by. This will appear obvious from a brief summing up of the doings of the convention.

One of the most important subjects that occupied its attention was that of a standard wheel guage, involving as it does the forms of treads and flanges, rail sections, and flange way upon track. The regular report of the committee on the subject of sharp flanges was superceded by an elaborate paper prepared by Mr. Forney, accompanied with diagrams of rail and flange sections, and a tabulated statement of the diversities of practice in track-laying, locating frogs, guard-rails, etc. Although the paper effectually covered the whole ground, it was rather embarrassing than otherwise, on account of the difficulties set forth, every one of which must be overcome before any thing like a standard wheel gauge, except in name, is possible. After a long discussion, chiefly in reference to the radius of the throat of flange and corner of rail top, the whole subject was re-committed to the committee, who are to confer with the officers of permanent way and report at the next annual meeting of the Association.

The committee on standard trucks presented three plans of freight trucks designed to satisfy the advocates of rigid and swing-beam frames; not for adoption as standards, but only as containing elements to assist the convention in determining whether the rigid or swing-beam principle is best. A new committee was appointed.

The committee on the subject of freight car framing and trussing saw no reason for any difference in the general style and plan of framing for 20, 25 or 30 ton cars. The committee was continued, with instructions that the future standard truck should have the diamond form, channel iron cross-transoms, a 5-foot wheel base, and be adapted to either swing or rigid bolsters. After these instructions had been agreed to, it was decided by a vote of 32 to 30 that the standard truck should have a swing-bolster, which of course relieves the committee from reporting a standard adapted to a rigid bolster. The closeness of the vote, however, suggests the possibility that the roads represented by the minority may not be willing to accept a standard indorsed by a mere nominal majority and with such a slight approach to unanimity.

The committee on the subject of a standard house car to carry 60,000 pounds, reported progress, and as a partial result, exhibited three completed cars, which, according to all accounts, were so well designed and constructed as to be proof against any serious adverse criticism. And yet the committee say in their report that the work before them in this matter of a standard house-car is only just begun. The committee was continued.

The report on brake-shoes embodied the usual series of questions and answers, the answers showing such a diversity of opinion that the committee refrained from making any recommendation, and merely suggested the great importance of having some of the parts of the brake apparatus decided upon, so that the matter could be turned over to the executive committee for final consideration. This committee was also continued.

The brief report of the committee on automatic freight car brakes and the discussion which followed, were very inconclusive as to the practical advantages of these brakes, except as applied to trains composed mainly of special cars. The Westinghouse freight brake was said to work well upon short trains, but the testimony in regard to the efficiency of various other brakes was conflicting. Buffer brakes had proved a failure on the Pennsylvania and Baltimore & Ohio roads. The only definite action taken was the adoption of a resolution by a vote of 20 to 11, that none of the freight brakes which derive their power from the compression of the draft spring, so far as they have been tried, have fulfilled the conditions of a good brake.

The report of the committee on automatic freight car couplers very naturally caused a little breeze of excitement while it was under discussion. The time is evidently near at hand when the Association must decide whether it will do something or nothing, and the greater the pressure for a choice between these alternatives, the more difficult it is to choose. Nothing was done but to refer the matter to the executive committee, with authority to investigate the merits of couplers, provided the railroad companies will pay the expense of such investigation. Whether they will do this is yet to be determined. The report of the committee shows very clearly, not which is the best coupler extant, but the perplexing and distracting nature of the duties it had undertaken to perform. It had given the subject "careful thought," had "experimented and tested," it "realized the importance and magnitude of the work," urged that the subject should "not be passed upon lightly," that it should be "thoroughly discussed," and that the best coupler when found should be promptly recommended for adoption—in all of which it is safe to say inventors, railroad men, outsiders and the public generally, most heartily concur. It was finally resolved that the best coupler, mechanically, was one which coupled "along a vertical plane," so as to couple with unequal heights of draw-bars, and that in any selection made, the "very considerable merit" of the following named couplers should be recognized, viz.: Cowell, Archer, United States, Ames, Mitchell, Wilson-Walker, Conway-Ball, Gifford.

The convention adjourned to meet next year at Fortress Monroe. The conclusion of the proceedings will be given in our next issue.

IRON CARS.

Some of the enthusiastic advocates for iron cars have got the impression that the Car-Builder does not favor their construction as being superior to the general run of wooden cars. This impression is a mistaken one. We are most decidedly in favor of cars made of iron, or steel, or paper, or wood, or of any other material or combination of materials, provided their first cost, cost of repairing, weight, durability, carrying capacity, etc., are such as to show their superiority to cars made of other materials.

The iron car question is not a new one. It has been agitated for years, and a great many iron freight cars of various classes have been built, but owing to the natural aversion of railroad men to innovations of a radical kind, these cars do not seem to have obtained a foothold sufficiently permanent to place them in successful competition with wooden cars in ordinary freight service, although we are free to admit that very respectable progress is being made in that direction. Since the earlier and ruder constructions of a dozen years ago, there has been a very perceptible improvement, but this improvement, so far as we can learn, has not been so much in diminished weight and greater proportionate carrying capacity, as in a better constructive use of material as regard facility in the making of repairs. What kind of record these cars have made we are unable to say, but the inference is that it is not such as to be decisive as to the superiority of iron to wood construction, or the results would have been spread before the world. The importance of reducing the cost of freight service in order to meet the demand for cheaper transportation is so great that railroad companies can hardly be so blind to their own interests as to persist in building and using wooden cars if it can be made to appear that iron cars are the most serviceable and economical. It is claimed in behalf of iron cars that they are stronger and lighter in proportion to weight of load. This is doubtless true; but not so very much stronger, for the reason that the weight must be kept at a minimum. The difference is not so great, at all events, as to override all other considerations. It is true that iron will not splinter nor burn, but it will bend and double up. In the forms in which it is used in car body construction it may resist shocks as well as wood, but certainly not any better, and it is absolutely necessary that the parts comprising the entire body framing shall be put together in such a way that any one of them can be readily taken out and repaired, or replaced by a new one. Iron already enters largely into the construction of wooden cars, in the form of truck frames and body-bolsters, and steel is beginning to be used for brake-beams. It does not necessarily follow, however, that because iron is a good material for trucks and body-bolsters it must be equally good for floor-frame and superstructure.

What we have said has reference more particularly to freight cars. These, with insignificant exceptions, are now built of wood, and, like passenger cars, are designed according to the principles of wood construction so far as their bodies are concerned. The natural tendency has been to make iron car construction conform to that of wood, when the difference in the two materials does not admit of it. It is manifest that if iron cars are ever to supersede wooden ones the material must be used constructively *as* iron, and without reference to the peculiarities of wood construction.

If railroad men are slow to appreciate the advantages claimed for iron freight cars, it is reasonable to expect that they will be slower still to admit the feasibility of iron or steel passenger cars—that is, cars with metallic bodies that will be practically non-combustible. The design of such a car, that would really be a model for imitation, would be such a wide departure from present construction that a first attempt could hardly be a success except by a miracle. Yet the problem is nevertheless a fascinating one. Many such cars have been designed and built, on paper, and we have now before us an elaborate lithographic print of a cylindrical steel passenger car which is being constructed in Boston. As yet it is only about half completed, and, as stated in the circular which we print elsewhere, is designed to supersede the ordinary wooden passenger cars in use upon steam railroads. We can form no opinion as to its merits, nor would we like to express an opinion if we had any. The only conclusive test it can have is a year's service on the track, and if it should be so unfortunate as to be thrown from the track in a collision, but without material injury to the car or to passengers, the event could hardly fail to attract the favorable attention of railroad men all over the country. The parties deserve the greatest credit for their enterprise as well as the utmost encouragement in carrying it to completion.

It is a common remark, even among railroad men, that iron cars will sooner or later come into general use, in view of the fact that timber is getting scarce and more expensive, and that the supply must ultimately run short. The inventors and advocates of iron cars must therefore bide their time. If they think, as some of our correspondents evidently do, that we are too apathetic in helping along the reform they have so much at heart, how exasperated they must be at the snail-like progress of the Car-Builders' Association in this matter, as evidenced by the brief and inconclusive reports made from time to time by the long-continued committee on "Iron and Steel in Car Construction." In its report made last year the committee intimate that all are of one mind on the subject, but tha each is waiting for somebody else to take the lead, that it has taken many years to bring wooden cars to their present excellence, and it should not be expected that iron cars can be perfected all at once.

RAILROAD COMMISSIONS.

These agencies are the natural outgrowth of railroad extension and development, and can be made in the highest degree serviceable to railroad corporations and the public or a useless burden upon both. The first one was created in 1869, and since then they have sprung into existence in more than half the States. The need of some kind of supervisory power intermediate between the people and the legislature, has become more apparent if not more imperative every year. The relations between individuals and communities on the one part, and a multitude of railroad corporations operating numerous lines competitive and otherwise on the other, render such commissions indispensable in order to protect the public against extortion and unfair discrimination, as well as to prevent existing laws applicable to such corporations from becoming inoperative from non-observance These commissions thus far are of various types. A few of them are active and efficient, while others may be said to exist only on paper.

In their organization it is in the last degree essential that they should be composed of men who know, not merely *something* about railroad operation and management, but pretty much everything that can be derived from large experience, study and observation. This, however, can hardly be looked for if the appointments are to be influenced by political reasons, or if they are sought for the emoluments attached to them.

Assuming that conscientious and thoroughly capable men are selected, what should be the extent of their authority and the scope of their functions as a board of commissioners? This is a question about which there has been much diversity of opinion. Where it is difficult to draw a precise line between too much and too little power it is wiser to err on the safe side. The object is to ascertain what defects and abuses exist that need to be corrected. This can be done by a rigid and systematic inspection of road-bed and track, shops, stations, equipment, safety appliances, codes of rules, etc.; the investigation of alleged grievances, causes of accidents, systems of accounts, traffic rates, and whatever it is for the interest of the public to know, and embody the same in a report to the legislature, giving in this way a publicity to the methods and practices of the roads that could not otherwise be made with the same weight of authority. Publicity is what is wanted, and this is all that is necessary to remedy a large proportion of the abuses that creep into railroad management. There is no need for investing these commissions with any arbitrary power, judicial or otherwise. They should simply have authority to investigate and report. If obstructions are thrown in their way or information withheld that can be rightfully asked for, the legislature is competent to deal with that state of things.

There is another and special duty which might be imposed upon them with great advantage to the public, and that is to act as a bureau of railroad statistics, the companies in every State where there is such a bureau to be compelled by law to make full and uniform reports to it. This matter of making full reports will probably be left to the discretion of the companies for a good while yet in many of the States, but the time will come when the securities of a road can not be so easily floated upon the strength of crooked and partial reports as they have been in recent years.

Marden's Steel Brake Beam.

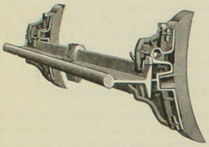
The cuts show the general features of this inproved brake appliance, including brake-beam, brake-head and clamp.

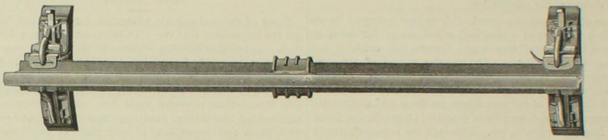
These beams have been in use about a year, and there are now some 2,000 of them in service on passenger and freight cars. As an improvement upon wooden beams and the various patterns of brakes shoes and heads in general use, the steel beam with its attachments may be considered as new, and in its economical aspects deserving of the attention of railroad men. The improvement has been devised and patented by Mr. A. H. Marden, of the Fitchburg Railroad, and the following claims in its behalf and descriptive details of construction, have been furnished us for publication:

The objects of the invention are,

1. To substitute a durable, light steel beam for the perishable wooden beam now in use.
2. To provide a beam of great strength, yet with sufficient elasticity to prevent such an excess of power being applied to the wheels as to cause them to slide.
3. To provide a malleable iron brake-head that shall be adapted to the most popular forms of brake shoes, and that shall have the greatest strength and at the same time the least weight.
4. To provide a brake beam and attachments, which, in saving cost of repairs, diminishing the wear and damage of wheels, and by lessening the time a car need be out of service, shall prove an economical substitute for any like appliance now in use.

The beam proper is made of steel specially rolled for this purpose in the form of a "deck beam," its proportions being such as to combine the greatest strength with the least weight. These proportions are as follows: Width of beam, 5¼ in.; thickness in the center, ⅝in.; flange of the T, 3⅝ in. wide by ⅜ in. thick; length of beam from centers of brake-heads 5 ft.; total length of beam 5 ft. 5¼ in.





While the shape of the beam makes it a truss to a certain extent it is still sufficiently elastic to prevent its bringing such a pressure to bear on the wheels as to entirely overcome their friction on the rail and cause them to slide. The saving to wheels which is thus gained by the use of this beam is considered a very important point in its favor, and which will amount to several times its cost every year.

The malleable iron head has the advantage of lightness, strength and adaptability. It is fastened to the steal beam very simply and securely, as follows: A slot is cut in the lower edge of the T flange of the beam, ¼ inch deep and 3½ inches long. The head is cored out to fit the flange, and when in position over the slot a wrought iron key is driven in opposite the slot, which lifts the head into the slot and secures it. The key is made tapering at one end with a half head at the other end. When driven home and the tapered end turned up it secures the head firmly and prevents rattling. There are no pins nor bolts to work loose, nor nuts to work off and be lost. Only one bolt is required to secure the center clamp, which is of malleable iron and fits the T flange of the beam.

The beam with its attachments complete weighs 96 pounds. It is as nearly indestructible as any thing of the kind can be, and on this account will commend itself to railroad men who are aware of the heavy expense involved in the repair and renewal of brake-beams. Further information may be obtained by addressing The Marden Car Brake Co., Room 3, Sears Building, Boston, Mass.

THE Detroit Steel and Spring Works, which is one of the most interesting manufactories in the West, is an illustration of the progress which has characterized many other ventures in that favored city. Commencing operations a few years ago as the Detroit Car Spring Company, they began the making of spiral springs for freight and passenger cars. The superior quality of their springs—every spring being tested before leaving the manufactory—soon became known, and their spiral spring business was a brilliant success from the beginning. This is another illustration that in this country there is always room for a commercial necessity if it is of first-class quality. In a very short time the necessary plant was added for the making of elliptic springs for passenger and sleeping cars and other kinds of railroad rolling stock, as well as for miscellaneous vehicles—carriages, buggies, &c. It can be said truly that the success that attended this new departure has fully justified the expectations of the company. The springs, made of the best steel applicable and treated by the best-known methods in their manufacture, ranked from the outset as A1, and equal to the finest elliptic springs ever made. Every conceivable kind of spring is now made by the Detroit Steel & Spring Works, as may be seen by their extensive and instructive catalogue recently issued. The enterprise of the growing company did not, however, stop here. They are now, with additional capital and costly facilities, in such a position of advantage that they are independent of any other concern for any part of their product; melting their own steel into ingots, hammering and rolling the same into bars ready to be transformed into any conceivable kind of springs or their many other specialties.—*N. Y. Daily Graphic.*

THE Cummer Engine Co., of Cleveland, O., have shipped another Ballentine Ice and Refrigerating Machine to the Robert Portner Brewing Co., of Alexandria, Va., and will shortly ship two more of them to the Buffalo Co operative Brewing Co. The Refrigerating Machine recently shipped by the Cummer Co. to Albert Ziegele & Co., of Buffalo, has been started up with great success. The company has just furnished a 225 h. p. engine to the Amoskeag Mfg. Co., at Manchester, N. H., and will in a few days ship a 67 h. p. engine to Stults & Kile, Orwell, O. Orders are in hand for a 55 h. p. engine, with complete outfit, for Todd & Hosford, Eugene, Ind.; a 350 h. p. engine for Carlton, Foster & Co., Oshkosh, Wis.; and one of 55 h. p., outfit complete, for A. Dietly & Son, Moorheadville, Pa.

THE National Railway Patent Waste Co. report orders for Cotton Seed Hulls during the month of March, 100 per cent. in ad vance of those for February. and those during April 50 per cent. over March.

THE *Southern Industrial Record*, published at New Orleans, and at Atlanta, Ga., is the new name of the "Railroad Record," heretofore published at Atlanta. It is a monthly journal of 24 pages, well printed on fine paper, with a handsomely illustrated cover. Besides giving due attention to current railway matters and Southern industries, the coming World's Exposition, at New Orleans, will be a marked feature of its contents. It will also be enlivened with miscellaneous matters, biography, humor and independent comment on general top ics. Mr. A. L. Harris, of Atlanta, is its general manager. Price one dollar a year.

Panics Then and Now.

It is wrong to estimate the financial and business condition of this country by past standards. A panic that would have upset our monetary fabric twenty, fifteen, or even ten years ago, would scarcely make a tremor in it now. To say nothing of the stability of the currency and the improved and safer methods of banking, the greatly increased diversity of our industries within the last decade, and the greatly augmented capitalization of manufacturing, railroad and business plants, has placed affairs on a deeper and broader foundation than formerly. The machinery of industry and business is now on a vast and perfect scale, and it requires something more than an ordinary financial flurry to stop its revolution. The wants of 55,000,000 people, a large proportion of whom are well-to-do, are continuous, and must be supplied. It is impossible that dullness in demand for goods can long continue when there is so much inevitable consumption. Each department of trade and industry has enlarged to a prodigious degree, so that a minimum movement of such leading lines as the grain, flour, the meat, provision and grocery trades, the distribution of lumber and coal and domestic goods, without the least show of a boom, necessitates an immense volume of business. This is seen in all the large centers of the country. In New York, Chicago and other great distributing centers, though the times are called dull, the thoroughfares are crowded with traffic, so that a novice could not say from outward appearances that there was any sluggishness in trade. As a matter of fact the condition of business is judged of nowadays more by the rise and fall above a certain point that can be called "good" than in any degree below that point. Men now are apt to judge of their success very much by the amount of overdoing they are able to accomplish. Nothing now satisfies the driving business man but a boom, which means more or less inflation and liability to collapse.—*Northwestern Lumberman.*

AN Iowa man has invented a sheet-iron cat, with cylindrical attachment and steel claws and teeth. It is worked by clockwork. A bellows inside swells up the tail at will to a belligerent size, and, by a *tremolo* attachment, causes, at the same time, the patent cat to emit all noises of which the living bird is capable. When you want fun, you wind up your cat and place him on the roof. Every cat within half a mile hears him, girds on his armor and sallies forth. Frequently fifty or one hundred attack him at once, No sooner does the patent cat feel the weight of an assailant than his teeth and claws work with lightning rapidity. Adversaries within six feet of him are torn to shreds. Fresh battalions come on to meet a similar fate, and in an hour several bushels of hair, toe-nails and fiddle-strings alone remain.

A MECHANICAL genius in New Orleans has invented a contrivance consisting of a neat little skeleton attachment for the roof of a street-car, with the hinge just over the door. It is rather ornamental than otherwise, and does not in the least interfere with passengers. The driver works it by a sort of treadle. When he sees a boy catching on the step he will go through the usual forms. He will look indignant and threaten the boy and appear to be awfully riled; and of course the boy will grin and stand on one leg, and waggle his finger against his nose in derision. Just at this interesting crisis the driver will stamp his feet with vigor, and a thing like a grappling-hook will suddenly fly down and wrench out the seat of that boy's trousers, and snatch him several feet to the rear of the car, where the inevitable milk-cart will run over him.

As cool a person, under the circumstances, as was ever heard of, was a young nobleman who, in a frightful railroad accident, missed his valet. One of the guardians came up to him and said, "My lord, we have found your servant, but he is cut in two." "Aw, is he?" said the young man, with a Dundreary drawl, still with anxiety depicted on his countenance. "Will you be gwood enough to see in which half he has gwot the key to my carpet-bag?"

Wilmington.

At Wilmington, when night drew nigh,
Few were the trains that passed thereby,
And very dreary was the sigh
  Of travelers waiting dolefully.

But Wilmington another sight
Saw when the train came late at night,
Commanding oil and gas to light
  The dark and quiet restaurant.

By soups and coffee fast allured,
Each passenger a place secured,
Except the drowsy souls immured
  In heavy sleep's imprisonment.

Then rushed the crowd by hunger driven,
Then vanished buns, in pieces riven,
And louder than the orders given,
  Fast popped the ale artillery.

But further yet the train shall go,
And deeper yet shall be their woe,
And greater horrors shall they know,
  Who bolt their food so hurriedly.

Time's up! but scarce each seated one
Can pierce the steam-cloud's rolling dun,
Where heavy tart and heavier bun
  Lie in dyspeptic sympathy.

The combat thickens. On, ye brave!
Who scald your throats in hope to save
Some spoonfuls of your soup; the knave
  Will charge for all he ladles ye.

Few, few digest where many eat;
The nightmare shall wind up their feat;
Each carpet-bag beneath their seat
  Shall seem a yawning sepulchre.

Our Directory.

We note the following changes since our last issue. Our readers will do us a great favor by giving us prompt notice of any changes that may come to their knowledge or of any errors that may be noticed in our list.

Boston & Lowell.—C. S. Mellen has been appointed Superintendent of the entire line; James A. Taylor is Superintendent of Motive Power, with office in Boston; and George E. Todd, recently of the Northern Railroad, is Superintendent of the New Hampshire Division.

Buffalo, New York & Philadelphia.—Oliver Watson has resigned the position of General Manager, and the office has been abolished.

Chicago & Atlantic.—J. C. Williams has resigned the position of General Superintendent.

Chatteroi.—F. H. Oliphant has been appointed General Manager in place of Chas. H. Rockwell, resigned.

Gulf, Colorado & Santa Fe.—W. H. Reilly has been appointed Master Mechanic and Master Car-Builder, in place of Geo. B. Nichols, resigned.

Louisville, Evansville & St. Louis.—W. H. Field has resigned the position of Purchasing Agent, and the office is abolished.

Louisville, New Albany & Chicago.—John B. Carson, late of the Hannibal & St. Joseph, has been appointed General Manager. John McLeod is again reported to have resigned as General Superintendent.

Louisville & Nashville.—Levi Hege, late of the Henderson Division, has been appointed Superintendent of the Decatur and Montgomery divisions, in place of E. Marsh, resigned.

Northern Pacific.—J. W. Smith, recently assistant to J. B. Cable, Superintendent of the Rocky Mountain and Idaho divisions, has been appointed Superintendent of the Idaho Division.

Troy & Boston.—A. Brewer has been appointed Master Car-Builder, vice R. V. Coon, resigned.

Employment.

WANTED.—A position as Master Mechanic, or Foreman in a Locomotive Machine Shop or Car Works, by a first-class machinist who has had ten years' experience in the building of locomotive engines and railway cars. Good references furnished. Address NATIONAL CAR-BUILDER, Morse Building, New York, N. Y. 2 t.

WANTED.—The manufacturer of a Railroad Specialty that has been very successfully introduced on several roads, wishes to meet with a gentleman who can influence further business. Address "Equipment," office of NATIONAL CAR-BUILDER.

WANTED TO PURCHASE.—One Axle Lathe, one Boring Mill and one Wheel Press; or, would hire a Machine Shop containing these and other tools. Address "Machinery," Office of the NATIONAL CAR-BUILDER, Morse Building, New York.

CAR SHOP MACHINERY FOR SALE.

THE FITCHBURG RAILROAD COMPANY offer for sale one second-hand Car Wheel Borer, a good, strong machine, will do excellent work, can be used for splinning. Also, one second-hand Car Wheel Screw Press, capacity 100 tons.

These machines are suitable for small Car Shops, are in good order and ready for use. For terms, address F. S. Pratt, Purchasing Agent, Fitchburg R. R., Boston, Mass.

The painting of a Freight Car has usually been considered an unimportant matter, hence the rapid decay and shabby appearance of so many cars. The Perfect Method of painting Freight Cars is on the principle that the foundation coat is as important as the priming and filling up of a Passenger Coach; the last coat as important to resist the action of decay as the quality of varnish on a Passenger Coach. We will gladly inform all who are interested more fully by correspondence.

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CHICAGO & ALTON RAILROAD CO., A. V. Hartwell, Purchasing Agent, Chicago, Ill.
CHICAGO & NORTHWESTERN RAILROAD CO., R. W. Hamer, Purchasing Agent, Chicago, Ill.
LEHIGH VALLEY RAILROAD CO., L. Chamberlin, Purchasing Agent, Philadelphia, Pa.
NORTHERN RAILROAD OF CANADA, F. W. Cumberland, Superintendent, Toronto, Ont.
NAUGATUCK RAILROAD CO., G. W. Beach, Superintendent, Waterbury, Conn.
PHILADELPHIA, WILMINGTON & BALTIMORE RAILROAD CO., S. A. Hodgman, Superintendent of Motive Power, Wilmington, Del.
NEW YORK, NEW HAVEN & HARTFORD RAILROAD CO., R. N. Dowd, Commissary, New Haven, Conn.
UNION PACIFIC RAILROAD CO., } A. D. Clark, Purchasing Agent, Omaha, Neb.
KANSAS " " }
CHICAGO, BURLINGTON & QUINCY RAILROAD CO., Wm. Irving, Purchasing Agent Chicago, Ill.
LOUISVILLE, CINCINNATI & LEXINGTON RAILROAD CO., Wm. Mahl, Purchasing Agent, Louisville, Ky
GRAND TRUNK RAILWAY N. Wall, Port Huron, Mich.
LITTLE ROCK & FORT SMITH RAILROAD CO., T. Hartman, Purchasing Agent, Little Rock, Ark.
GILBERT & BUSH CO., Troy, N. Y. }
WASON MANUFACTURING CO., Brightwood, Mass. }
BILLMEYER & SMALL MANUFACTURING CO., York, Pa. } Railroad Car Builders.
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The advantages derived from the use of such Special Colors are many, a few of which are found below: **ABSOLUTE UNIFORMITY OF SHADE. DURABILITY,** as we use perfectly pure materials. **SAVING OF MONEY,** because of small quantity required. **SAVING OF TIME,** in the putting on of the same. **SAVING OF LABOR AND MATERIAL,** as no extra amount of Varnish will be required to hide a sanded surface **LARGER DEGREE OF CERTAINTY** that there will be an absence of cracked work, as our mixtures are all uniform, being done by weight only.

We make any desired shade, it only being necessary that purchasers furnish us with sample of color desired, stating the time they would like to have the paint dry in.

We shall be glad to furnish samples and give prices to any who may wish to avail themselves of the above advantages.

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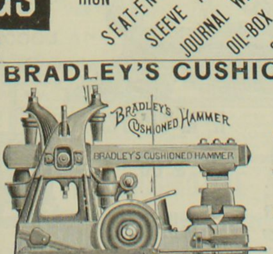

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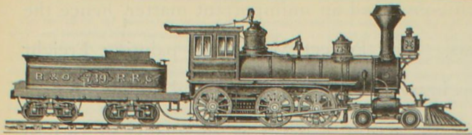

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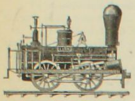
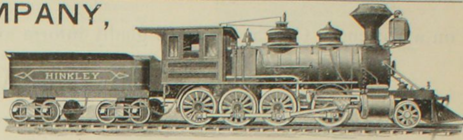


LION, 10 TONS. HINKLEY. 1839.



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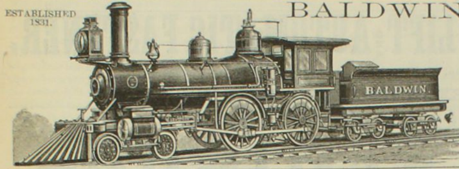

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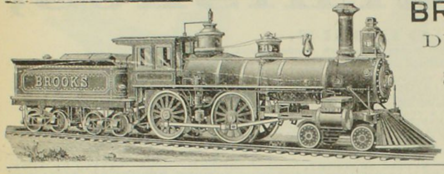

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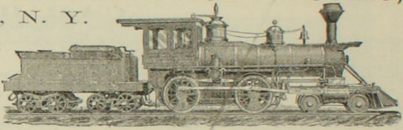

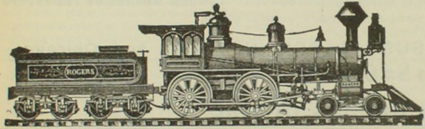

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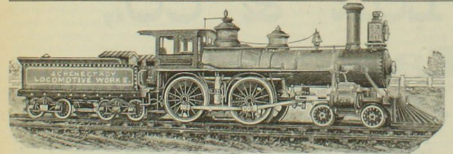
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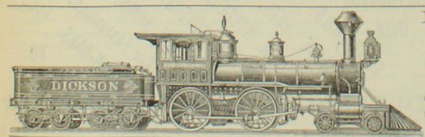

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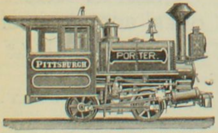

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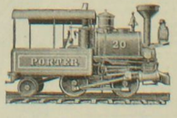

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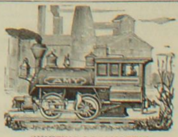
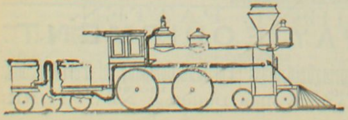
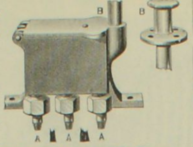


SHIFTING LOCOMOTIVE.



THE ASHTON VALVE COMPANY,
271 Franklin Street, Boston, Mass.
The Ashton Blow-back Safety-valve is constructed so as to conduct the escape steam which is blown off back to the tender, or to the smoke-box and up the chimney. By this arrangement the heat of the escape steam, instead of being wasted as it is when an ordinary safety-valve blows off, is communicated to the cold water in the tender. This not only results in an important economy, but it renders the escaping steam noiseless, and the increase of temperature of the water has a tendency to deposit some of its impurities before it is pumped into the boiler. It thus *stops the noise! saves fuel! and all engines steam better and faster, and do more effective work with these valves* than with those in ordinary use.

Campbell's Automatic Oiler for Locomotives,
FOR OILING AUTOMATICALLY
THE BOX, SHOE AND WEDGE
OF LOCOMOTIVES.



L. B. FLANDERS MACHINE WORKS,
PEDRICK & AYER, Proprietors.
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CIRCULARS AND PRICES ON APPLICATION.
☞ WE REFER, BY PERMISSION, TO THE PENNSYLVANIA RAILROAD CO.

OFFICE OF FIRE MARSHAL, CINCINNATI, O., Feb. 28, 1884.

The Cincinnati Corrugating Co., Cincinnati, Ohio:

GENTLEMEN—My experience fully sustains the justice of the fire laws of Cincinnati and the usage of the Insurance Companies doing business in our City, viz.: In ranking CORRUGATED SHEET IRON with Brick or Stone for practical efficiency against fire.

Yours truly,
(Signed), JOSEPH BUNKER,
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FULTON'S SPECIAL BRONZE BOXES, FOR PASSENGER CARS.
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JAMES McMILLAN, President. J. B. WAYNE, Vice-President and Manager. HUGH McMILLAN, Secretary.

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For Bearings of Locomotives, Cars and Machinery,
SLIDE VALVES, CYLINDER RINGS AND STEAM CONNECTIONS.
SAVES OIL AND REPAIRS, PREVENTS DELAY TO TRAINS, AND NEVER CUTS THE JOURNALS.

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Time, Money and Danger Saved to Railroads and Coach Painters.

For removing old Paint or Varnish from Woodwork. Iron, Glass, etc., *without the use of Fire, Hot Irons, or Scrapers.* Does its work *neat, cheap and rapid. Does not raise the grain of the wood or injure the fabric operated upon. Does its work in less than an hour, 60 minutes.* Can be repainted at once as nicely and effectually as when originally primed. Does away with the use of *Fire, Hot Irons or Scrapers.* Does not injure the workman. Applied with an ordinary paint brush upon any surface which can be painted. Will not run. After old paint is softened it is easily removed by water. One gallon of compound will remove all the paint or varnish on a square (10 × 10 feet). Price list sent on application. Reasonable discount to the trade. Orders, correspondence and tests solicited. Manufactured and sold only by

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RAILWAY TRAIN POWER BRAKES
BEST IN THE WORLD.
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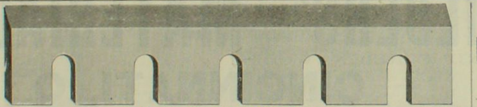
We would call the attention of Master Mechanics and Master Car-Builders to our
PEERLESS BEARING METAL,
Claiming it to have more Anti-Friction qualities and to be more durable than any Bronze or Brass on the Market.
The Metal is for Sale Either in Ingot or Castings.
DAMASCUS BRONZE COMPANY, PITTSBURGH, PA.



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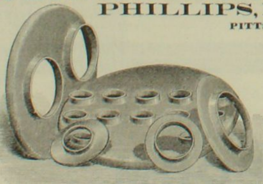

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"Sligo" Bar, Band, Sheet and Angle Iron.
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"TYRONE" BRAND BAR, SHEET, TANK PLATE & ANGLE IRON.
Quality our Specialty.
BOILER HEADS AND FLUE HOLES FLANGED TO ORDER.
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Patented March 14, 1865; April 8, 1873; Sept 9 1873; Oct. 6, 1874; Jan. 11, 1876.
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IMPORTED RUSSIA IRON,
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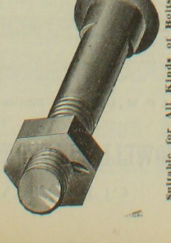

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I will Remove and Prevent Scale in any Steam Boiler, or make no charge. My Remedy will also Neutralize the most destructive waters, and prevent
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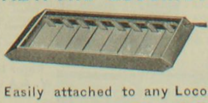

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Easily attached to any Locomotive, guaranteed to save over Four and One-half Tons of Coal in every Thousand Miles run.
No burning of Grate Bars. No carting away of Cinders. No risk to Human Life.

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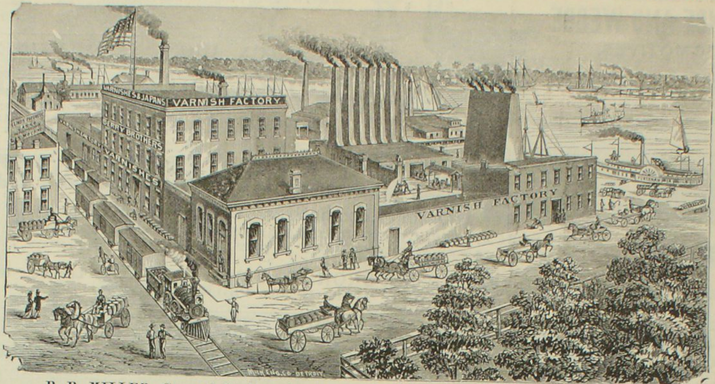

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MANUFACTURED TO SIZES SPECIALLY ADAPTED FOR

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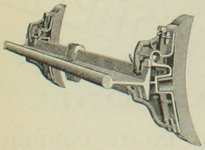

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To Fit any Shoe.
Security.
Durability.
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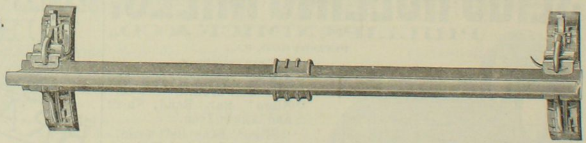

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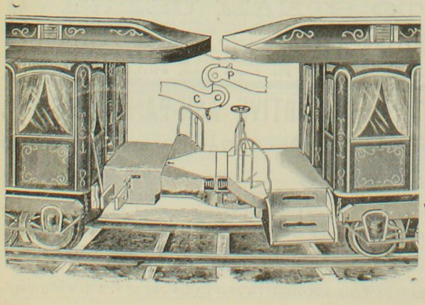
Is the only device forming **A CONTINUOUS FLOOR** between cars in motion, and **PREVENTING JERKING** in starting and stopping trains.



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Is an Improvement on the Miller and Works with it.

"Entire Satisfaction"—"Perfect Satisfaction" are the words used by R. F. Smith, Gen'l Manager Cleveland & Pittsburgh R. R.; Hiram Fowler, Supt. Connecticut Valley R. R.; J. W. Thomas, Gen'l Supt. Nashville, Chattanooga & St. Louis Ry.; J. G. Sawyer, Master Car-Builder same road, and many others.

"The most practical and perfect device in use"—S. L. Bell, an old Conductor Western & Atlantic R. R.; G. R. Carr, Gen'l Sup't Columbus, Hocking Valley & Toledo R. R.; J. W. Babcock, for years conductor N. Y., Pa. & Ohio Ry.; Gen P. Pease, of Ohio Central Railway.

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"A great improvement over any other device I have seen"—J. H. Tinney, Sup't N. Y. & Greenwood Lake Railway.

"It prevents jerking in starting and stopping trains," say Messrs. Babcock, Bell, Couch, Thomas, Tinney and others.

"A great saving to railroads," say Messrs. Smith, Thomas, Tinney, Fowler, Bell, Babcock, and others.

Refer to the Flint & P. M., Utica I. & Elmira, Cin. Southern, C., N. O. & T. Pacific, W. & A., etc., etc.

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MANUFACTURE CHARCOAL IRON EXCLUSIVELY.

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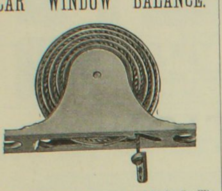

For Passenger Coaches, Sleeping and Parlor Car Windows, consisting of Cone and Coil Spring with wire cord balancing the weight of sash; noiseless in operation and placed entirely out of sight. Adopted by many of the leading roads. No car complete without them.

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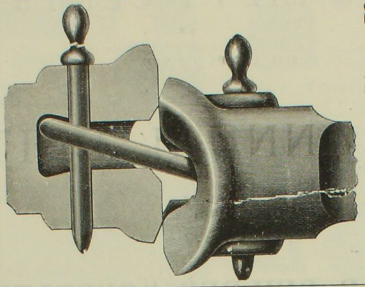

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"VICTORY OVER MORE THAN 30 CONTESTANTS."

Victory over more than 30 Self-Couplers in the Master Car-Builder's Convention of June, 1876. Also indorsement for safety in coupling by the Yary Masters, in their Convention, June, 1877, and by 300 others who were unable to attend the Convention, and 300 railroad officials who are resident in 26 States, and who admitted superiority over any other yet produced. Try 30 free of royalty, and see for yourself! Pattern free, and no change in timbers or connections. Those made by Wilson, Walker & Co., Pittsburgh, Pa., *will save 200 per cent. in repairs*, and give double life service over *old styles of* wrought iron. About 43,000 in use by 146 railroads. The *saving in repairs* by using *my invention* is from 20 per cent. to 80 per cent. as per *report of many officers.*

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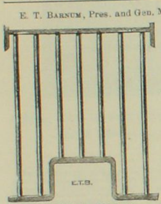

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WE MAKE A SPECIALTY OF LOCOMOTIVE SPARK-NETTING, OFFICE RAILINGS, TICKET WINDOWS, WICKETS, BUILDERS' IRON WORK, WIRE ROPE.

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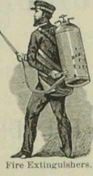

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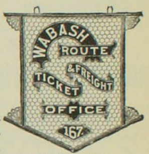
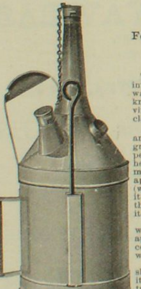


Wire Depot Signs.

NOYES'

Patent Liquid and Condensed COOLER.



For Cooling Railroad Car and Steamboat Journals and Bearings of all Kinds, and for Mixing with Other Oils.

The attention of those who are running heavy journals is respectfully invited to the above Liquid Cooler. It has been successfully used for upward of ten years, and is constantly growing in favor as its merits become known, and we are confident that practical men cannot fail of being convinced that our preparation deserves their candid attention. What we claim for it is:

That it will Cool a Hot Journal When in Motion,

and extinguish the flame when the box is on fire; that its use will, in a great measure, prevent the occurrence of a hot journal and save the expense, delays and annoyances incident thereto; that it will eliminate the heat from a journal at a temperature greatly below the point required to melt the babbitt, preventing the accumulation of heat, and by a timely application save it from destruction; that its non-inflammable elements (where waste is used) permeate the waste and prevent its taking fire; that it keeps the journal smooth and polished, preventing unnecessary friction; that its combination is based upon true scientific principles which render it impossible to fail in its results, and is the

Only Preparation that will Cool a Hot Journal

while it is in motion, as attested by certificates below; that one thorough application on a hot journal will do more execution in cooling than the constant application of water for half an hour, besides doing it evenly and without loss of time.

Every Railroad Train or Steamboat

should have a can of the Liquid packing on board, with the directions for its use pasted upon it, and thus have always at hand the means of effectually cooling a hot journal, and thereby avoid the expense, danger and trouble from this cause.

WHAT RAILROAD MEN SAY OF IT.

SALEM, Aug. 7, 1872.

MR. P. NOYES.—*Dear Sir:* I have been using your Liquid Packing for cooling car journals for some time past and have been well pleased with it. I have had occasion to use it a number of times, under Pullman cars, and it has been a complete remedy in every case of hot journals.

Yours truly,
J. P. SOMERBY,
M. C. B. Eastern Railroad.

(Copy).
CLEVELAND, O., June 9, 1883.

NOYES MFG. CO., Boston, Mass.—Please furnish on account of this company and send invoices in duplicate direct to my address, 3 barrels Noyes' Patent Liquid Cooler. Mark packages: A. C. Robson, Buffalo, N. Y.; F. O. Bray, Adrian, Mich.; A. Merritt, Cleveland, O.

Yours truly,
(Signed). A. C. ARMSTRONG,
Gen'l Purchasing Agent L. S. & M. S. Ry. Co.

SALEM, Aug. 28, 1880.

I can recommend Noyes' Liquid Cooler as an excellent article to carry on trains for use in case of Hot Journals, which it cools without injury to the journals more effectually than anything I know of

J. B. BILLINGS,
M. C. B. Eastern Railroad.

BOSTON, April 7, 1880.

P. NOYES, Agent.—*Dear Sir:* Please send for account of Eastern Railroad five barrels Liquid Cooler.

GEO. J. FISHER, P. A.

BOSTON, May 24, 1877.

P. NOYES, Agent.—*Dear Sir:* Having used your Liquid Cooler two or three years I find it necessary for the safe running of our cars to continue its use. When the cooler is mixed with black oil, according to directions, the compound is equal to lard or sperm oil, and it is the best Cooler I have ever used.

Yours truly, JOHN F. CROCKETT,
Master Mechanic Boston, Lowell & Nashua R. R.

BOSTON, April 23, 1880.

NOYES MFG. CO.—*Gents:* Please send to East Cambridge, for account Boston & Lowell Railroad, five barrels Liquid Cooler.

Yours truly,
F. H. NOURSE,
Purchasing Agent.

Our Liquid Cooler is now in use, and has been from one to eight years, upon the following roads, and we have numerous recommendations from them: Boston & Maine R. R., Boston & Lowell R. R., Cin., Wabash & Mich. Ry., Boston, Concord & Montreal R. R., Fitchburg R. R., Eastern R. R., New York, New Haven & Hartford R. R., New York & New England R. R., Connecticut River R. R., Scioto Valley R. R., Old Colony, Lake Shore & Michigan Southern Ry. Co.

In ordering state whether it is desired for general Lubricating or Cooling. The Condensed is sold, especially for Lubricating, by the Pound and the Liquid by the Gallon, as low as any article of the quality in the market.

SEND FOR A BARREL. NO CHARGE UNLESS IT DOES ALL WE STATE.

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We are sole agents for the Improved Car Axle-Box Dust Guard and are Agents for the Ormsby Patent Car-Sash Balance and Lock.

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ORDERS AND CORRESPONDENCE SOLICITED. | PRATT & LETCHWORTH, Proprietors.

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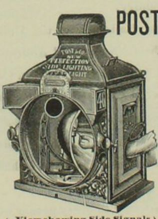


(View showing Side Signals, Numbers and Nicholson's Pat. Colored Signals, with Reflector turned in position for lighting. No more lanterns required on Engines.)

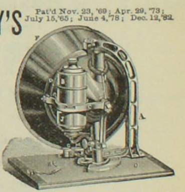
NEW PERFECTION

SIDE-LIGHTING

HEAD-LIGHT,

Largest AND BEST Head-Light MADE.

The New Reservoir is constructed on our **American Student Lamp principle**, which keeps the oil at a **constant level** until **all is consumed**, thereby saving 2 inches of each **wick**, and it overcomes the **unsteadiness** of the flame, caused by **splashing** of the large body of oil in the reservoirs of ordinary **Head-Lights** out to be refilled. This reservoir can be **readily taken out to be refilled.** Send for Circular of



(View showing Manner of Mounting Reflector, and New Oil Reservoir.)

REVOLVING AND STATIONARY LIGHTS.

POST & CO.,

Patentees and Manufacturers, *CINCINNATI, OHIO.*

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☞ Send stamp for same,] In our List No. 23. [stating what you want. ☜

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Complete lists of every Car and Locomotive Builder, Axle, Car Wheel and Car Spring Manufacturer in the United States and Canada.

All the Rail Mills of the country.

Complete lists of the Street Railroads in the United States and Canada, their Gauge, Weight of Rail, Mileage, number of Cars and Horses, Officers' Names and Addresses.

The Railroads (both Steam and Street) in Mexico, Central and South America, the West Indies, with the Gauge, Weight of Rail, Mileage, number of Cars and Locomotives, Officers' Names and Addresses, etc.

This is the only publication that has ever given this information.

And about one hundred pages containing the advertisements of the best and most responsible Manufacturers of Railway Material, forming a conveniently indexed collection of trade circulars or an illustrated catalogue of almost everything used on a railroad.

It will be distributed *gratuitously* to every person whose name appears in it, and in addition will be sent to every General Manager, Superintendent, Purchasing Agent, Chief Engineer, Master Mechanic, Master Car-Builder and Road Master of all Railroads in the United States and Canada.

To all others the price will be 50 cents per copy, and it will be mailed on receipt of price.

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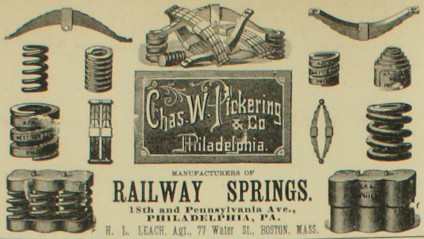

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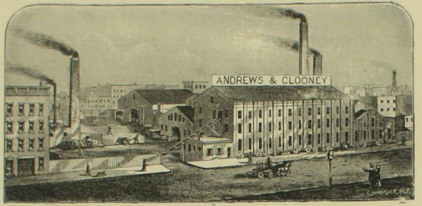

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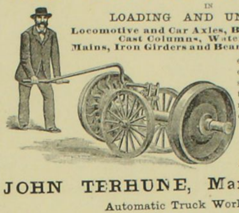

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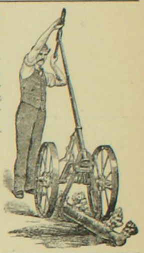

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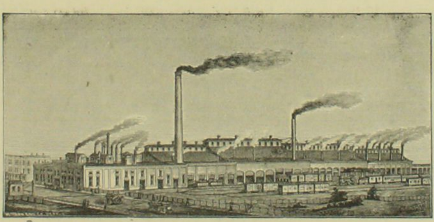

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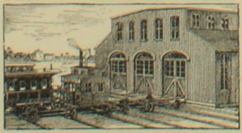

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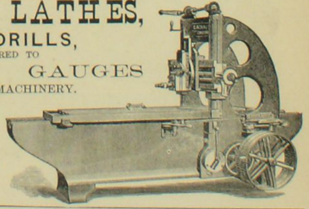

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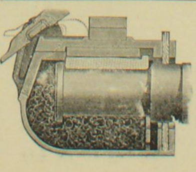

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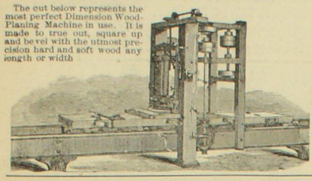

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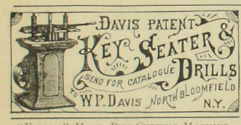

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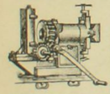

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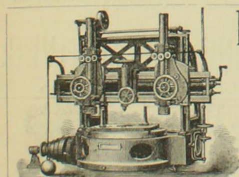

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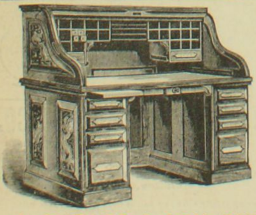

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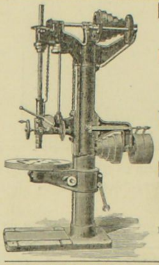

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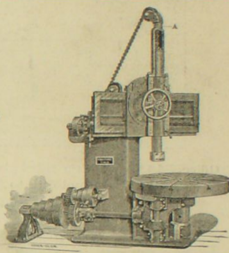

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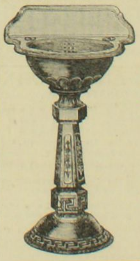

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